Meats, Seafood, and Poultry

Partnerships for Food Industry Development
A U.S./C.I.S./Nicaraguan/South African Partnership

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Third Semi –Annual Report
(Phase II, January 15 – June 30, 2006)

PFID - MSP

Submitted by

International Programs
Louisiana State University Agricultural Center
Baton Rouge, Louisiana

In association with

The World Food Logistics Organization, Alexandria, VA

The International Institute of Food Safety and Quality, Kyïv, Ukraine

Rapadani, Ltd., Tblisi, Georgia

Stellenbosch University, Stellenbosch, South Africa, and

The Cooperative League of the USA – Nicaraguan Chapter, Managua, Nicaragua

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List of Acronyms

AFDO ..... Association of Food and Drug Officials
AWP ..... Annual Work Plan
BDS ..... Business Development Service
BPCS ..... Better Process Control School
CCC ..... Commodity Certification Center (of Azerbaijan)
CIDEA ..... (Research Center of Aquatic Ecosystems at University of Central America)
CIS ..... Commonwealth of Independent States
CLUSA ..... Cooperative League of the USA (Nicaraguan Chapter)
FDA ..... Food and Drug Administration
FPA ..... Food Products Association
FSIS ..... (USDA) Food Safety Inspection Service
FSQ ..... Food Safety and Quality
FSQO ..... FSQ Organization
HACCP ..... Hazard Analysis Critical Control Point
HCPI ..... Host Country Partner Institutions
ICS ..... In-Country Satellite
IEHA ..... Initiative to End Hunger in Africa
IIFSQ ..... International Institute of Food Safety and Quality
ISO ..... International Standards Organization
KNUTE ..... Kyïv National University of Trade and Economics
LABAL ..... (Nicaraguan Food Technology Laboratory)
LSU AgCenter ..... Louisiana State University Agricultural Center
MAGFOR ..... Ministry for Agriculture and Forestry
MCFQS ..... Moldovan Center for Food Quality and Safety
MIFIC ..... (Nicaraguan Ministry of Commerce)
MINSA ..... (Nicaraguan Ministry of Health)
PFID ..... Partnerships for Food Industry Development
PFID-MSP ..... PFID – Meat, Seafood and Poultry
PHTC ..... Post Harvest Technology Center
PIVA ..... Partner Institutional Viability Assessment
RAC ..... Risk Assessment Conference
RSA ..... Republic of South Africa
SAIL ..... Schaffer and Associates International Ltd.
SAR ..... Semi-Annual Report
SOP ..... Sanitary Operation Procedures

SPS ..... Sanitary/Phyto-Sanitary
SSOP ..... Sanitation Standard Operating Procedures
SUN ..... Stellenbosch University
TTA ..... Training and Technical Assistance
TTT ..... Train the Trainer
UEM ..... University of Eduardo Mondlane
UNAM ..... University of Namibia
USAID ..... United States Agency for International Development
USAID/EGAT ..... USAID/Economic Growth, Agriculture, and Trade
USDA/FAS ..... USDA-Foreign Agricultural Service
USAID/RCSA ..... USAID/ Regional Center for Southern Africa
USt ..... University of Stellenbosch
WFLO ..... World Food Logistics Organization
ZATAC ..... Zambian Agri-business Technical Assistance Centre

Section I. Summary and Introduction

This is the third Semi-Annual Report (SAR) of the Partnerships for Food Industry Development for Meat, Seafood and Poultry's (PFID-MSP's) second phase of operation and the eleventh SAR overall for the USAID/EGAT-funded leader award. Under Phase II, the Project was jointly undertaken by the Louisiana State University Agricultural Center (LSU AgCenter), the World Food Logistics Organization (WFLO), the Ukraine-based headquarters of the International Institute for Food Safety and Quality (IIFSQ), the IIFSQ's In-Country Satellites (ICSs), the University of Stellenbosch (SUN) in the Republic of South Africa (RSA), and the Nicaraguan Chapter of the Cooperative League of the USA (CLUSA). To date, the IIFSQ's ICSs include the Moldovan Center for Food Safety and Quality of Chişinău, Moldova (MCFSQ – note however that this Center's contract under the project expired at the end of last year) and Rapadani, Ltd of, Tblisi, Georgia while efforts are being made to contract the Commodity Certification Center (CCC) of Azerbaijan.

The PFID-MSP program has recorded several results during this reporting period. This is summarized in Annex A's comparison chart, while Annex B summarizes participation during PFID-MSP activities conducted during Fiscal Year 2005. Among the highlights for this reporting period are:

- The IIFSQ's development and use of Auditor Checklists to verify the proper design of Hazard Analysis and Critical Control Point (HACCP) plans by stakeholder processing plants;
- The IIFSQ's continued HACCP consultations provided to stakeholder plants;
- Continued demand of the IIFSQ's services, as verified by its third short-term technical assistance award from the International Finance Corporation (IFC);
- The Better Process Control School (BPSC) was conducted in Kyïv for the second time;
- Two South Africans and one Nicaragua successfully completed Train-the-Trainer (TTT) instruction for Seafood HACCP; and
- The LSU AgCenter is continuing implementation of the Associate Award in Southern Africa, particularly seafood HACCP TTT, plant-based training and technical assistance, training in market and business planning and increased access to financing.

Key issues and future activities include the following:

- Internet provider problems have hindered the development of IIFSQ's web page;
- Many Ukrainian canning facilities do not yet see the need for the BPCS;
- The preparation of the course material for the Post-Harvest Technology Center (PHTC)-designed Block Man course turned out to be much more time consuming than was originally anticipated;
- IIFSQ will conduct HACCP courses in Ukraine and the Republic of Georgia;

- A Risk Assessment Conference (RAC) will be held in May 2007;
- After presenting appropriately 75-100% of the course in Year III, IIFSQ will be authorized to independently conduct the BPCS;
- The PHTC of the RSA will conduct its first cold chain course early next year; and
- CLUSA and the LSU AgCenter will collaborate in conducted a basic certification course for seafood HACCP next year.

Section II. Eastern Europe/Commonwealth of Independent States

The International Institute of Food Safety and Quality (IIFSQ) has generally achieved the Annual Work Plan (AWP) targets and in some cases is ahead of the AWP work schedule.

A. IIFSQ Expansion

1. Accomplishments

As a follow-up of the HACCP Auditor course attended by IIFSQ staff in October 2005, IIFSQ developed its internal procedures for conformity assessment. This involved HACCP preparation of auditor check-lists based on ISO 22000:2005 requirements for food safety management systems. In particular, the following documents were developed:

a) Requirements for HACCP Auditors;
b) HACCP System Certification Procedure;
c) Check-lists;
d) Non-compliance Recording Form,
e) Introductory and Final Meeting Forms;
f) Audit Reporting Form;
g) Application Forms and Questionnaires for facilities requesting certification.

These documents were recognized by a National Certification Body called the Ukrainian Scientific and Production Center for Standardization, Certification and Metrology, (UkrMetrTestStandard, formerly UkrCSM) and used for evaluation of Gerber S.A, a baby food processing facility located in Poland. The evaluation of this facility and the assessment of its food quality/safety management system is a necessary step for the processor to receive a product certificate that is valid for three years. Only after positive results of inspection and product testing was the facility approved to export to Ukraine. Selected check-lists were used for practical exercises at the March 14-16 seminar (see below). Some of the above-mentioned documents were tested and verified during the audit of Aquafoods Ltd. (formerly Aquavit facility, IIFSQ's client since 2003). These examples demonstrate that the IIFSQ's reporting forms and check-lists serve a range of uses, including evaluation and audit of foreign facilities, as they conform to international requirements.

IIFSQ keeps regular contacts with its ICS in Georgia (Rapadani); the Georgian firm identified and arranged for attendance by two Georgian participants of the Better Process Control School conducted in Kyiv on May 30-June 2, 2006.

A substantial part of IIFSQ's efforts involved provision of general information seminars on food safety and HACCP. As previously mentioned, IIFSQ conducted a seminar "Food Safety Management Systems based on ISO 22000:2006 – Practical Development and Implementation Aspects" in March 2006 with UkrMetrTestStandard. Forty-eight persons were trained and a similar seminar is requested in other locations. Other informational seminars include a general HACCP seminar in January (for twenty-seven individuals) and two one-day seminars for bakery representatives (for forty-five persons).

In January and then in April-May 2006, IIFSQ consulted with the Donetsk Frozen Food Factory on HACCP implementation and documentation. In March 2006, IIFSQ conducted a preliminary audit of a new poultry facility in Odessa City; recommendations related to Good Management Practices compliance were given and food safety consultations provided.

To promote food safety issues, six articles were published in Ukrainian industry magazines. IIFSQ's Director General also participated in a meat and milk industry conference, a meat processors workshop and a tradeshow. This participation included presentations on topical food safety issues. IIFSQ continued its collaboration with the Kyïv National University of Trade and Economics (KNUTE) including proposal preparation, hosting of the Better Process Control School (mentioned later) and coordination of the graduate exam commission.

IIFSQ continues to provide fee-based services to stakeholders and recently won its third short-term technical assistance project funded by the International Finance Corporation (IFC). The project is implemented jointly with a Swiss consulting company (Swiss TS) and a beneficiary is Cheese Club Company, one of the largest cheese processors in Ukraine. Such projects demonstrate the demand for IIFSQ's services both locally and internationally.

2. Issues and Future Activities

The current Annual Work Plan and the Budget provide for one Basic HACCP training course to be conducted in a CIS country besides Ukraine. Given the well-developed relations with Rapadani in Georgia, that country was selected and (based on IIFSQ's assessment of the Georgian food industry) Basic Meat & Poultry HACCP was selected as the training to be conducted. Upon Rapadani's recommendation, the training is scheduled for September 2006. IIFSQ provided information about the training course – including agenda, desired number of participants, status of IHA and its certificates – to Rapadani, which is preparing an article to be published in Ukrainian industry magazine. Venue for the course and invitation of participants will be organized by Rapadani.

By the end of 2006 at least two basic certification HACCP courses will be conducted in Ukraine, one for seafood, the other one for meat and poultry processors. A Kazakh company, Agrostandard-XXI Century, also has contacted IIFSQ and requested a series of certified HACCP training courses in Kazakhstan; it also sent two participants to the BPCS. IIFSQ's linkages in Georgia and Kazakhstan further demonstrate the regional demand for its services.

In the previous reporting period, IIFSQ reviewed a draft regulation (the Law of Ukraine on Meat and Meat Products) and found that the draft law was not in full compliance with previously approved laws and international requirements. These findings were made public at a public

hearing in which many other stakeholders shared IIFSQ's opinion and the draft law was suspended. Later, due to the current political situation in Ukraine since the March parliamentary elections, the Parliament of Ukraine has not yet convened and is not ready to review any draft regulations so no expert reviews were provided during this reporting period.

HACCP audit check-lists have proven to be a very useful form of registration of audit findings, and can even be used as an audit report (Refer to a sample in Annex C). The check-lists, in addition to audit findings, also include audit requirements that make it much easier for a facility to develop and implement corrective actions.

IIFSQ was going to develop a new web-site but, in May, it experienced significant access problems with its Internet provider. When the renovation of the building housing IIFSQ is complete and a broadband line is installed by September, IIFSQ should have access to a more reliable Internet provider and develop the web site with that provider. IIFSQ also identified office equipment to be purchased but this was hindered by the Project's current budget situation. In addition, IIFSQ's regional center in Azerbaijan is not yet established due to a lack of funding. When the funding issue is resolved, IIFSQ will resume the process.

B. Food Security Capacity Building

On June 9th, Dr. Michael Moody gave a lecture "Introduction to Food Security", which furthered his food security efforts started in Year I. Provided under the auspices UkrMetrTestStandard, the lecture was attended by twenty-two persons (seventeen women), most of whom were government officials and processors.

In addition, a special meeting with Dr. Moody regarding the preparation of a Risk Assessment Conference (RAC) to be held in May 2007 was conducted; potential participants were identified and an initial draft agenda was discussed. IIFSQ will continue preparation of the RAC.

C. Better Process Control School

1. Accomplishments

The Better Process Control School (BPCS) has been established as an annual activity of PFID-MSP's Phase II, which both provides new skills to processors (particularly on thermal processing) and expands IIFSQ's training capacities. From May 29 to June 2, 2006, the BPSC was conducted in Kyïv for the second time. In conformance to the AWP, almost fifty percent of the course (seven of the sixteen topics) was presented by Ukrainian lecturers (Dr. Myroniuk and Professor Natalia Prytulska of KNUTE). The sixteen topics were as follows:

- Microbiology of Thermally Processed Foods;
- Acidified Foods – given by Dr. Myroniuk;
- Food Container Handling – given by Dr. Prytulska;
- Food Plant Sanitation – given by Dr. Myroniuk;
- Records for Product Protection;
- Principles of Thermal Processing;
- Process Room Instrumentation, Equipment, and Operation – given by Dr. Myroniuk;

- Still Retorts – Pressure Processing in Steam;
- Still Retorts – Processing with Overpressure;
- Hydrostatic Retorts – Continuous Container Handling;
- Agitating Retorts – Continuous Container Handling;
- Agitating Retorts – Discontinuous Container Handling;
- Aseptic Processing and Packaging Systems;
- Closures for Metal Containers – given by Dr. Prytulska;
- Closures for Glass Containers – given by Dr. Prytulska; and
- Closures for Semi-rigid and Flexible Containers – given by Dr. Prytulska.

As preparation, IIFSQ drafted invitation letters and BPCS brochures and disseminated them to over 200 processors in Ukraine. To support the School promotion, an article *Process Control Methods for Canned Foods: US Experience* was published in Food Products magazine, in June 2006. In addition, IIFSQ sent special invitations to Ukrainian canning facilities registered with FDA. For programmatic preparation, Dr. Myroniuk visited a local canned vegetables processor to study retort operating practices most commonly used in Ukraine. Also, the LSU AgCenter provided a set of instruments for double seam evaluation that were demonstrated to the BPCS participants. Twelve people (including eight women) attended; participants came from Ukraine, Georgia and Kazakhstan. At the course's conclusion, ten students passed the entire set of core modules required for FDA certification, namely: Microbiology of Thermally Processed Foods, Food Container Handling, Food Plant Sanitation, Records for Product Protection, Principles of Thermal Processing, and Process Room Instrumentation, Equipment, and Operation. All participants received certificates of attendance.

Dr. Steven Spinak, a retired FDA official who gave lectures with Dr. Moody and the Ukrainian trainers, was favorably impressed with the course's conduct. After the course, he wished to visit local canneries and assess general canning practices in Ukraine. IIFSQ arranged a visit to a vegetable and soup canning company called Veres JSC, located in Kaniv City. During his tour, Dr. Spinak identified a number of discrepancies with US Regulations and informed the facility's management. Despite such non-compliance, the company had already exported its products to the USA. Dr. Spinak promised to initiate a process of inquiry from FDA to respective agency from the Government of Ukraine regarding possible FDA inspection of those Ukrainian canneries that are exporting to the United States.

The Food Products Association (FPA) also sent a representative, Mr. Joseph Schlegel who concurred with Dr. Spinak's favorable impression of the course. The FPA allowed the translation of its text *Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation* and other materials into Russian for this course. Both Dr. Spinak's and Mr. Schlegal's reports were favorably reviewed by Dr. Moody's and are included in Annex F

2. Issues and Future Activities

The stakeholders who passed all the tests are to receive certificates of satisfactory completion. After presenting appropriately 75-100% of the course in Year III, IIFSQ will be authorized to independently conduct the BPCS.

The IIFSQ noted that, though many large canning facilities from Ukraine who currently export to the United States were invited to participate, none of them accepted the invitation. IIFSQ spoke with all of them over the phone, and they explained their unwillingness to participate due to the fact that over the years of exporting they had never experienced any problems with FDA and USDA, even though they are not in compliance with relevant US low acid/acidified canned food Regulations, as was observed by Dr. Spinak. This situation led Dr. Spinak to conclude that FDA needs to pay more attention to the region of Eastern Europe; he is going to initiate the government-to-government process of inspection request, and draw a draft request letter from FDA to a competent Ukrainian authority. IIFSQ committed to provide Dr. Spinak with contact information of the competent authority; however, this authority is not yet identified as the Government is not yet formed. Initial arrangements for the third BPCS in 2007 will include provision of this necessary information.

Dr. Spinak and Mr. Schlegel made a number of recommendations, particularly related to examinations.

Section III. South Africa

PFID-MSP's day-to-day activities in the Republic of South Africa are being coordinated by the Project's South African partner institution, the University of Stellenbosch with Professor Louwrens Hoffman as the primary representative. The Project Scope of Work commits PFID-MSP to address the following programmatic objectives in its South Africa Component:

- Project Object # 1 - Post Harvest Technology Center (PHTC);
- Project Object # 2 - Food Safety and Quality; and
- Project Object # 3 – Value Added Post-Harvest Technology – Cold Chain Technologies.

A. Post Harvest Technology Center

The SUN-PHTC's primary goal is to serve as a platform for PFID services focusing on the application of HACCP and promoting value-added post-harvest technology. Having been formally established last year, the PHTC spent the past reporting period concentrating on curriculum development and initial course conduct.

1. Accomplishments

Based on previous assessments, WFLO noted that one course encompassing all relevant cold chain material could become unwieldy and may not draw an audience with a more narrow set of job duties. WFLO therefore proposed the design and implementation of a short course covering either basic warehouse operations or a short course pertaining to product handling/display at the

supermarket. In order to ascertain which topics ought to be developed further as the PHTC's pilot program, WFLO sent two staff members to conduct a needs assessment of the sectors relevant to the two proposed courses—refrigerated warehouse facilities and supermarkets.

Based upon the information collected during the needs assessment, WFLO decided to develop a 2.5 day course, which will, pending further feedback, include some combination of the following modules (Refer to WFLO's Needs Assessment Report in Annex F for more information):

- Introduction to Warehouse Operations;
- Sanitation Standard Operating Procedures (SSOPs);
- Food Science Basics;
- Refrigeration Fundamentals;
- Energy Management;
- Innovations in Warehouse Technology;
- Forklift Safety and Maintenance;
- Emergency Procedures Training; and
- Crisis Management.

These topics have been circulated to the industry and SUN has received feedback. Presently SUN and WFLO are finalizing a date (January 2007) for the first course to be held. Thereafter South African and international lecturers will be identified to give the course.

In June 2006, Agricultural Economists Dr. Hector Zapata (of the LSU AgCenter) and Randall Fortenbery (of the University of Wisconsin) conducted a seminar entitled "Business Planning: Starting the Process" at the University of Stellenbosch. While Dr. Fortenbery's activities were geared toward development of Hands On, (a stakeholder association under the USAID/Southern Africa-funded AA), Dr. Zapata's work in South Africa was sponsored by the USAID/EGAT-sponsored Leader Award in that it was geared toward facilitating the PHTC's establishment as a financially viable entity.

Ms. Suné Botha, the PHTC's Associate Coordinator, attended the seminar and found it useful in presenting all the concepts of writing a business plan. She learned that, to be able to write a business plan, one needs to do considerable market research and acquire a lot of relevant information. She appreciated that, irrespective of applying for financing, any business should have a well written business plan that includes a management guideline, a mission statement and a description of how the business will address future problems and growth.

The PHTC is developing "block men" training courses for abattoir and breaking plant workers regarding the typical primal cuts for various carcasses. The Block Man course consists of twenty-nine individual Unit Standard Titles which addresses specific topics of meat processing. Each Unit Standard Title contains guidelines for the lay-out and course material that should be written and discussed under the specific topic. Out of the twenty-nine titles, the PHTC was asked to write twelve (see Annex D) – showing the industries recognition of the Center's technical capability. Of these twelve, four titles have been completed, while three are in the process of being written and two are being delayed due to the inability of the allocated person to find time to write the course material for those titles.

2. Issues and Future Activities

A slow response from the industry regarding the cold chain courses have resulted in a delayed completion of course material and re-scheduled application of first course to January/February 2007 (after the holidays). After finalizing the schedule, SUN/PHTC will reserve facilities, advertise the course (particularly through the South African Refrigerated Distribution Association or SARDA), nominate lecturers and develop teaching materials.

The preparation of the course material for the Block Man course turned out to be much more time consuming than was originally anticipated. Since the lay-out of the course material is done according to the Unit Standards guidelines, (as determined by the South African Qualifications Authority, Registered Qualification), a lot of time is needed to gather and organize the appropriate subject information. In addition, while the typing the Unit Standards, it came to Northlink College's[1] attention that additional course material is necessary for the successful presentation of the Unit Standard course material. For a person to understand certain concepts of the Unit Standard, general background information, which is not part of the Unit Standard, needs to be available. These additional course material modules are called the "Learning Assumed to be in place". There are thirteen such "Learning Items" (see Annex D), of which three have been completed and two are in the process of being written.

SUN/PHTC will find additional help, such as pre- and post-graduates students to help with the writing of the course material. However, students are busy with their own projects and with tests and seminars so it is difficult to find students who are able to devote as much time as needed to finish the writing of more than one Unit Standard Title.

Drs. Zapata and Hoffman discussed PHTC activities. It is Hoffman's opinion that the PHTC may have a strong possibility of success by providing training support to the private sector. Dr. Hoffman wants to pursue this issue further with WFLO as initial discussions were conducted earlier in a U.S. meeting in Orlando, Florida. Dr. Zapata feels that the long-term sustainability of the PHTC lies in its ability to focus on services that the private sector in South Africa is willing to pay. In order to identify whether the center should focus on training, research, or other types of outreach programs, the PHTC may proceed in two steps. First, it should conduct a survey on the willingness-to-pay for PHTC services by the private sector. Second, they may develop a business plan for the long-term financial self-sustainability of the PHTC that is consistent with the diagnostics of the willingness-to-pay survey.

Dr. Zapata recommends that the PHTC write a proposal to secure seed money from the South African government to provide outreach programs for small-scale producers that may fall under the Black Economic Empowerment (BEE) program. One of the largest South African banks (ABSA), through the agribusiness group, has experience with educational programs consistent with BEE and may be one linkage to explore. Dr. Hoffman's recommendations in this matter were provided in an addendum to his trip report that was provided in the Quarterly Report of the Southern Africa Associate Award.

[1] SUN is contracting Northlink (Junior) College to conduct the course on its behalf (RSA law restricts Universities' authorization to directly provide labor training).

B. Food Safety and Technology, Issues and Future Activities

In April 2006, two South African stakeholders (1 female, 1 male, in addition to another South African who was sponsored by the USAID/Southern Africa Associate Award) went to Dallas, TX and received Train-the-Trainer (TTT) instruction in Seafood HACCP. The newly qualified trainers will be able to provide in-country HACCP instruction as recognized by the AFDO; they will start planning and marketing a Seafood HACCP course to coincide with the next visit in early 2007 by Dr. Michael Moody of the LSU AgCenter.

PFID/SUN is also providing an intervention to apply HACCP to game meat. Protocols have been developed for assessment and sampling of trophy hunted animals in terms of bacterial counts. This protocol will provide an implementation schedule for future activities.

C. Cold Chain Technology, Issues and Future Activities

PFID/SUN and WFLO have selected hot de-boning (characterized by rapid chilling) at the Swartland Ostrich Abattoir as a cold chain-related value added post-harvest technology to be examined under this Project activity. The following items were proposed by Robert Dickson of WFLO for the experimental evaluation of the cooling rates and methodologies to reduce temperature in various ostrich muscle cuts and to investigate the effects thereof on the meat quality during refrigerated storage (Refer to his Stakeholder Analysis Report in Annex F for more information):

- Warner-Bratzler shear values for tenderness;
- pH measurements;
- Muscle color scores; and
- Final micro-biological plate counts.

However, with the limited time available due to immediate handling of other projects, the completion of such an elaborate experiment will take more than 10 days as suggested by Mr. Dickson. Nonetheless, the PHTC Associate Coordinator designed a proposed experiment with some changes (see Annex E). This proposal will be changed and refined with more detail when she and Stephen Shrewsbury of Swartland Abattoir have further discussed this issue with WFLO and have decided on a suitable date to start these experiments.

During the winter time, very few ostriches are slaughtered, and it was therefore not yet possible to get a suitable date to start the experiments. Most ostrich abattoirs in South Africa close during the low season for ostrich meat during July every year for routine maintenance and for the slaughter of game species. When the summer starts again, more ostriches will be slaughtered on a regular basis and it will then be easier and more convenient to schedule ongoing experiments.

In addition, due to the small outbreak of Avian Influenza on an ostrich farm out side Mossel Bay in the Western Cape Province last month, slaughtering of ostriches has stopped for the time being. The European Union has decided to ban the import of ostrich meat from the Mossel Bay and Riversdale districts. The Onderstepoort Veterinary Institute characterized the virus as an H5N2 strain that is not related to the highly pathogenic H5N1 strain.

Meetings will be scheduled with Mr. Shrewsbury to plan the necessary experiments. All necessary equipment will be gathered and prepared (such as temperature-data loggers, packaging materials, refrigeration methods, etc.) for the planned experiments in the summer time.

Section IV. Nicaragua

PFID-MSP's day-to-day activities in Nicaragua are being coordinated by the Nicaraguan Chapter of the Cooperative League of the USA (CLUSA). The Project Scope of Work commits PFID-MSP to address the following programmatic objectives in its Nicaraguan Component:

- Project Object # 1 - Food Safety, Quality and Security Compliance;
- Project Object # 2 – Post Harvest Technology for Value-Added Products (Scheduled to be addressed next year); and
- Project Object # 3 – Plant-Based Training and Technical Assistance.

The second objective is to be addressed when Dr. Zapata visits Nicaragua to assess the economic viability of potential technologies but budget constraints have delayed that travel.

A. Food Safety, Quality and Security Compliance, Accomplishments

PFID-MSP's FSQ assessment reports were sent to the companies that were visited during the period of November, 2005 – January, 2006. The Certification and Procedures Office under the Ministry of Agriculture and Forestry's (MAGFOR's) Department of Food Safety and Security has been selected as the key FSQ Organization (FSQO) and relevant documentation was submitted to the LSU AgCenter. The FSQO is to serve as a repository of food safety issues and information and as a resource for training and policy intervention in Nicaragua after PFID-MSP's conclusion.

The office's goals are as follows:

- Design and evaluation of sanitary programs and their application;
- Develop the National Traceability system in Food Industries;
- Coordinate, supervise, and inspect food safety practices in the Nicaraguan food industry;
- Train plant processors and provide technical assistance on Good Management Practices (GMPs), Sanitary Operating Procedures (SOP) and HACCP; and
- Secure internationally recognized validation for stakeholder plants' food safety procedures.

A new policy initiative named "Integrated Nicaraguan System for Food Safety" arranges for collaboration between MAGFOR, MINSA (Health Ministry) & MIFIC (Commerce Ministry). This initiative will promote nationwide FSQ dissemination, expand training programs for hotels and restaurants (focusing on standardization and certification) and create traceability norms (supporting the system implementation for slaughterhouses).

One of the three Seafood HACCP Train–the–Trainer (TTT) candidates nominated by CLUSA was submitted and accepted by AFDO to participate in the instruction. Mr. Erick Sandoval, CIDEA/UCA (Investigation Center of Aquatics Ecosystems from the Central American University) microbiology laboratory chief, traveled to the Louisiana State University's main Baton Rouge campus to successfully complete the Seafood HACCP basic certification course. He then accompanied the two fore-mentioned South Africans to Dallas, TX on April 18th – April 29th, 2006 to complete the Seafood HACCP Alliance TTT Course.

B. Food Safety, Quality and Security Compliance, Issues and Future Activities

Of the three Nicaraguan TTT candidates, one was not chosen due to English language limitations and another's technical background did not meet the satisfaction of the AFDO selection committee. CLUSA/PFID-MSP is planning in coordination with Mr. Sandoval for the training in country for next year. The LSU AgCenter intends to send Dr. Jon Bell of its Food Science Department to assist Mr. Sandoval and to request USAID/EGAT to fund the travel of an FDA official who has previously participated before in PFID-MSP sponsored HACCP training.

Following Dr. McMillin's recommendation for potential HACCP TTT (meat & poultry) candidates, CLUSA requested seven candidates' resumes. Candidates will be evaluated by the LSU AgCenter and two of them will be chosen to undertake the training on November 2006. The schedule of the TTT (meat & poultry) program is not yet determined. CLUSA will assess the viability of conducting the training in Nicaragua because the number of qualified candidates in the country and the limited English that some of those candidates have. However, funding limitations might prevent this in-country conduct.

1. Laboratory Enhancement

With guidance from the LSU AgCenter, CLUSA is also proposing that an LSU AgCenter Lab specialist, Dr. Robert Beine, provide a technical assessment for Nicaraguan reference laboratories, leading to improved efficiency in the procedures of testing samples for exportation of meat products. The process will facilitate MAGFOR's efforts in obtaining accreditation for a national/regional reference laboratory. The process will start with a meeting with MAGFOR's laboratory managers to analyze and discuss the principal weakness and possible contributions from the program.

Dr. Beine met with Mr. Kenneth McMillin, (an LSU AgCenter meat scientist and member of the PFID-MSP Technical Team) to discuss the contributions that LSU AgCenter can offer to address Mr. Eduardo Fonseca's concerns about the LABAL (Food Technology Laboratory) activities. Mr. Fonseca was the General Secretary of the Industry and Commerce Promotion Ministry (MIFIC) during Dr. McMillin's trip. Dr. Beine is willing to offer specific suggestions on how the laws and regulations correspond to the analytical testing and how sampling and testing must fit together. He also will share much more information from his experiences and knowledge on how, why, and when government laboratories can be used for different purposes.

PFID/CLUSA met with MAGFOR personnel to discuss specific needs, which were identified as the following:

a) Accreditation as a national reference lab as certified by an international organization recognized in the international markets for Nicaraguan products;

b) Assessment and training on procedure and quality laboratory standards, including the provision of technical and administrative manuals;

c) Verification that the facility design conforms to international standards; and

d) Coordination between the three Ministries: MAGFOR (conduct of laboratory tests for import and export), MINSA (which provides internal and national control) and MIFIC (which should support the other two ministries).

2. Slaughterhouse Enhancement

Ms. Rebecca Ray and Ms. Megan Schildgen of George Washington University's Elliott School of International Affairs (Capstone Team; refer to their study in Annex F) travelled to Nicaragua on March 5th – 18th, 2006 under coordination with the LSU AgCenter and CLUSA. Their study explored the opportunities that the model of PFID-MSP could contribute to the small and medium size meat processor's products entering Nicaraguan markets.

Meetings and interviews were the principal data collection method used during the field trip. CLUSA coordinated a schedule in-country with the principal national and private slaughterhouses located throughout the pacific coast (Chinandega, León, Masaya, Granada, Chontales and Managua departments) where the majority of Nicaragua's population is located. The following questions formed the basic structure of the study:

a) What can be done to help small processors tap the bigger market in Nicaragua?

b) How big is a medium-size processor in Nicaragua? Which processors should PFID target first?

c) Are there ways for the medium-size processors to take advantages of new opportunities presented by CAFTA?

d) Are there ways to help the medium-size processors face the challenges presented by CAFTA and the larger processors' incursion into the small processors' traditional market?

As a result of the study, PFID-MSP received helpful recommendations in our activity planning. Ms. Ray and Ms. Schildgen's recommended future steps to be considered, including the following:

- Collaboration with MAG-FOR on their Inter-American Development Bank (IDB) project, particularly in improving inspections for the smaller slaughterhouses – this specific activity could be incorporated into the MAGFOR office that has been selected for the FSQO;

- Developing contacts and networks among the slaughterhouses;

- Reform of Law 158 (a law that was created to control cattle herds and ensure public health during the civil war but is not relevant to current conditions) , also through the FSQO
- Encourage the small slaughterhouses to apply for WFLO's Plant-base Training and Technical Assistance program.

C. Plant-Based Training and Technical Assistance

In the 2nd Annual Work Plan WFLO proposed to change the Nicaragua Cold Chain Technology Activity to one based on Plant-based Training and Technical Assistance (TTA). The first step was the application review and facility selection. CLUSA distributed an introduction letter and a description of the program. Applications were distributed to the following 8 recommended companies that were visited during the WFLO specialist's field trip:

- 2 slaughterhouses (NOVATERRA S.A; Proincasa)
- 1 poultry processing plant (Pollo Estrella)
- 2 processing plants (DELMOR S.A; Cainsa)
- 1 Detail market chain (Hipper La Colonia)
- 2 seafood processing plants (LANVINIC; PROMARNIC)

To date, only three of the fore-mentioned companies have submitted applications, which have been sent to WFLO. At this point, WFLO is analyzing the qualifications of the applicant facilities.

Following donor guidance, a shift in implementation will occur to mitigate development dependency of the targeted enterprises. The donor requested that the TTA program include more companies and people and that the enterprises demonstrate commitment to the program through financial contributions to offset project costs to implement the TTA. Thus, WFLO and CLUSA will be reviewing this shift in direction with the three companies applying to achieve two things: 1) secure a financial contribution from the applicant companies and; 2) include all three applicants as recipients of the TTA.

In the process of reviewing the application form from stakeholders, WFLO's management and CLUSA/PFID-MSP will select the appropriate facility and start a benchmarking and goal setting, organizing the field trip visit for WFLO specialist and conducting baseline collection.

Section V. USAID/RCSA – Funded Associate Award – Southern Africa

PFID-MSP has received an associate award funded by USAID's Regional Center for Southern Africa (USAID/RCSA). This Project is administered by the LSU AgCenter in conjunction with the following partner institutions:

- The World Food Logistics Organization (WFLO)
- Schaffer and Associates International, Ltd (SAIL)
- The University of Stellenbosch (USt), South Africa

- The Zambian Agribusiness Technical Assistance Centre (ZATAC)
- The University of Namibia (UNAM), and
- The University of Eduardo Mondlane (UEM), Maputo, Moçambique

A. Progress toward Meeting Project Activity Indicators

Other work items correspond to the following Project activities (full details are available in the Associate Award's 4th Quarterly Report of its 1st Year and the 1st Quarterly Report of its 2nd Year, already provided to USAID/EGAT):

Indicators	Highest Level of Progress
Project Activity - Food Safety, Quality and Security Compliance	
• At least four future seafood HACCP instructors receive basic certification in HACCP – this corresponds to the Initiative to End Hunger in Africa (IEHA) training categories of "Number of Male Individuals who have Received Training" and "Number of Female Individuals who have Received Training"	Four candidates from three PFID-MSP countries traveled in April to USA, completed TTT instruction in Dallas (Texas) and attained Trainer Certification (this is in addition to the two South African and one Nicaraguan who completed the course under the Leader Award);
Project Activity - Post-Harvest Value Added Technologies	
• Case studies of at least two post-harvest technology innovations involving alternative value-added use of available products in the region	Economic feasibility evaluation of new fish/seafood products was begun by PFID-MSP's Business/Marketing Specialist, resulting in the following recommendations: • Salmon smoking for Hands On in RSA; and • Value Added Processing from low value fish and Kuiseb Fishing Enterprises in Namibia.

Indicators	Highest Level of Progress
Project Activity - Plant-Based Technical Training Assistance (TTA)	
• At least one documented instance of training and technical assistance designed to increase plant efficiency and profitability of the participating firm – this corresponds to the IEHA Performance Indicator "Trade-supporting transactions and capabilities", specifically the number of targeted enterprises accessing Business Development Services (BDSs) in this case training and technical assistance.	WFLO Team Leader and Technical Specialist worked with management of União Geral das Cooperativas' poultry processing plant to provide TTA to that plant from March 18 through March 28
Project Activity - Association Development as a Way to Promote Group Marketing	
• At least five associations will be developed to provide marketing, advocacy and capacity building services to their members – this corresponds to the indicator "Number of Producers' Organizations, Trade and Business Associations and Community-Based Associations Assisted"	• WFLO Team used selection criteria to identify stakeholder food industry associations • The Technical Team's Business/Marketing Specialist and the Agricultural Business/Finance Specialist trained members of stakeholder associations for business planning in five stakeholder associations (with a total of sixty-two participants) • WFLO trained HCPIs for Partner Institutional Viability Assessment (PIVA) scoring for Food Industry Associations in Moçambique, Namibia and Zambia;
Project Activity - Producer-Processor-Market Linkages	
• At least ten firms will benefit from capacity building designs in market plans, business plans and online marketing	The Project's Agricultural Marketing Specialist trained thirty members of stakeholder associations in Namibia and Zambia

Indicators	Highest Level of Progress
Project Activity - Investment Opportunities/Leveraging Resources	
• Implementation of Action Plan that will realize at least four investment opportunities in the meat, seafood and poultry sectors in five target countries in Southern Africa, as well as outline measures to realize those opportunities – corresponding to the IEHA Performance Indicator "Trade-Supporting Transactions and Capabilities, specifically the number of targeted enterprises accessing BDSs (in this case financing)	• After meeting stakeholders and contacting sources of finance during trip to RSA and Zambia in January, PFID-MSP provided an outline to guide leveraging funds and a RSA-based financial consultant in continued leveraging process in that country. • The RSA-based financial consultant continued resource leveraging process in that country for Mokoroane Foods (pork processor), and obtained a commercial bank loan for Hands-on Cooperative (trout production/processing)

B. Deviations from Targets and Additional Information

Some of the work item targets for these reporting periods were not yet completely met:

Indicator	Status
Project Activity - Food Safety, Quality and Security Compliance	
• At least one food safety policy initiative will be advocated by the Project Partners up to passage by governing bodies - As this will entail collaboration between with private firms and national regulatory agencies, this corresponds to the Program Performance Indicator "Number of public-private partnerships formed".	USDA/Food Safety Inspection Service (FSIS) Equivalency in Namibia was originally selected as this policy initiative; however USAID/ Southern Africa postponed this activity until next year.

Section VI. General Management Issues

A. Program Development

In the SAR covering the previous reporting period, the LSU AgCenter reported the award of a USDA/Foreign Agricultural Service (USDA/FAS)-funded assessment for the food safety status that was later retracted. Since then, USDA/FAS did contract the LSU AgCenter to conduct a desk review of the Armenian food safety status. On favorable review of that study, USDA/FAS

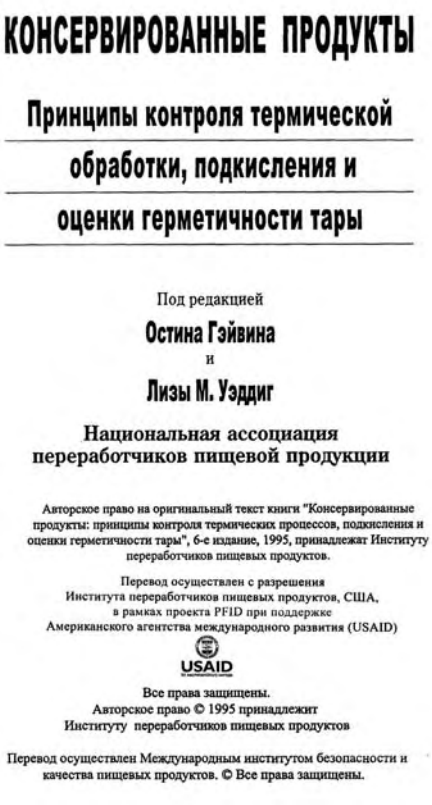
awarded a technical assistance program to support a sustainable food safety system in Armenia to the LSU AgCenter.

The LSU AgCenter, in collaboration with Southern University, has devised a strategy to establish a functional and sustainable food safety system for Armenia. The collaboration proposes to extend its technical expertise in training, policy analysis and food safety systems to support and enhance government regulatory agencies, the food industry and local universities. The program model is anchored on internationally recognized science-based safety and quality processes and standards including Sanitary and Phyto-Sanitary Measures (SPS), HACCP, Sanitation Standard Operations Procedures (SSOP), US Food and Drugs Administration (FDA) requirements, USDA requirements and International Organization for Standardization (ISO) standards including ISO 22000. Dr. Lakshman Velupillai (the Director of the LSU AgCenter's International Programs has successfully completed the project initiation and in-country start-up during a June trip to Armenia. Dr. Velupillai along with faculty members Kenneth McMillin and Michael Moody will travel to Armenia again in July to conduct preliminary risk assessment and stakeholder group meetings with emphasis on public health issues and to develop a finalized strategy for a four-year program.

USAID/Southern Africa is also seeking additional funds to support PFID-MSP's efforts to facilitate food safety standards equivalency of the Namibian meat industry with those of the USDA's Food Safety Inspection Service (FSIS). Such equivalency will assist the Namibian meat industry in meeting the FSIS equivalency requirements and become eligible to export meat products to the US.

B. Other Issues

To comply with USAID branding policy, the BPCS manual (translated into Russian), was appropriately labeled with USAID logo on the second title page (at right). The FPA-designed canned foods manual was similarly labeled by IIFSQ as were the following: all purchased equipment in RSA, all documentation in Nicaragua and the Project Web Page[2].



КОНСЕРВИРОВАННЫЕ ПРОДУКТЫ

Принципы контроля термической обработки, подкисления и оценки герметичности тары

Под редакцией
Остина Гэйвина
и
Лизы М. Уэддиг

Национальная ассоциация переработчиков пищевой продукции

Авторское право на оригинальный текст книги "Консервированные продукты: принципы контроля термических процессов, подкисления и оценки герметичности тары", 6-е издание, 1995, принадлежат Институту переработчиков пищевых продуктов.

Перевод осуществлен с разрешения Института переработчиков пищевых продуктов, США, в рамках проекта PFID при поддержке Американского агентства международного развития (USAID)

USAID

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Figure 1 Second Title Page of Russian version of Canned Foods manual, with USAID logo; the sentence above the logo reads: "Translated on permission of Food Processor Institute, USA, under PFID Project with support of US Agency of International Development (USAID

[2] http://www.lsuagcenter.com/en/administration/about_us/chancellors_office/International+Programs/Projects/partnership+for+food+industry+development/

The Project Monitoring Charts continue to enable PFID-MSP management to track activity progress and provide the logical framework for Annex A, the Project's Comparison Chart.

USAID/EGAT was only able to allocate part of the funds budgeted to PFID-MSP for its second year of operations. This has resulted in PFID-MSP having to postpone some of its technical assistance travel and obligations to its partner institutions (as previously mentioned) although savings from Year One lessened this effect. USAID/EGAT has since begun the process to release the remaining funds for Year Two and the LSU AgCenter has provided the documentation necessary to expedite this process.

Annex A

Summary Table Comparing 2nd Annual Work Plan (Phase II) Indicators with Actual Results of Reporting Period

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
Eastern Europe/CIS Component: Project Objective # 1 – IIFSQ Expansion			
Logistical Enhancement	Documented bidding process and purchase of necessary equipment	Items of office equipment for purchase identified	
	Status of a new IIFSQ web site, including decision to use World Lab-generated pages or to design new ones, is documented in Project monitoring mechanism	Web-site is being developed with combination of World Lab-generated pages and design new ones	Development has been delayed by server problems
Institutional and Programmatic Expansion	*Pending fund availability*: • Sub-contract between CCC and LSU AgCenter signed • Finalized communication mechanism between IIFSQ and ICSs documented	IIFSQ keeps regular contacts with ICS in Georgia (Rapadani), which sent two participants to the BPCS	Funds not yet available for sub-contract with CCC in Azerbaijan
Meat and Poultry HACCP Training	As a result of course conduct in Georgia, at least twenty Georgians receive basic certification in Meat and Poultry HACCP	On recommendation of Rapadani, the Georgian ICS, September will be the time to conduct the training	• Preparation for the training course - including agenda, desired number of participants, venue and invitations - will be organized by Rapadani • Preliminary approval from IHA is not required; the IIFSQ has a standing approval until February 2007
Seafood HACCP Training	Documented agreement between IIFSQ and MCFQS for identification/ initial planning of course in Moldova	Due to the period of summer vacations the issue has not yet been discussed	
Auditor Check Lists	Documented design status of lists – including criteria to be measured and benchmarks	Check-lists prepared (based on ISO 22000:2005; some of them where used for practical sessions at the seminar (March 14-16, see below)	These check lists were used during the audit of Aquavit facility in April

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
Auditor Check Lists (cont.)	Verification of lists – through approval by an official entity and/or incorporation into a formal plant audit or conformity assessment - is documented in the 11th SAR	Check-lists were used for certification of Gerber F.A. baby food Gerber F.A (Poland) by the Center for Facility Attestation and Management System Certification of the UkrMetrTestStandard	
Monitoring of on-going Activities	Documented progress toward the following year-end targets: • At least 3 general information HACCP seminars conducted, at least 60 persons trained • At least 3 food processors received food safety and HACCP consultations • At least 3 articles published each in Ukrainian, Georgian and Azeri food industry magazines • Expert reviews are provided to at least 3 draft regulations • Competency confirmed and certi-fied by independent third party	Accomplishments to date (including those from the previous reporting period): • 3 General information seminars for 120 participants plus two presentations by the Director General • 3 HACCP consultations (two for Donetsk Factory of Frozen Foods and one for a new poultry facility in Odessa) • 6 Articles published in Ukrainian magazines • Expert review provided to 1 draft regulation (the Law of Ukraine on Meat and Meat Products)	• Competency not yet confirmed; • May 22-26 - Dr.Myroniuk headed graduate exam commission at the KNUTE's Chair of Food Commodity Science and Expertise
Eastern Europe/CIS Component: Project Object #2 – Food Security Capacity Building			
Risk Assessment Seminar	As documented in the 11th SAR, at least twenty stakeholders are trained in relevant bio-security issues	22 persons attended Dr.Moody's lecture "Introduction to Food Security" conducted on June 9th at the premises of UkrMetrTestStandard (Ukrainian Center for Standardization, Metrology and Certification)	
Preparations for 2007 Risk Assessment Conference	Resolutions and an initial SOW pertaining to the preparation of the Risk Assessment Conference documented in Dr. Moody's travel report and/or the 11th SAR	A special meeting with Dr. Moody regarding preparation of the RAC was conducted; circle of potential participants identified, initial draft agenda discussed	

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
Eastern Europe/CIS Component: Project Object #3 – Better Process Control School			
BPCS, Conduct	Conduct of BPCS - as documented in the 11th SAR: • At least 50% of the course is presented by local instructors • At least twenty stakeholders are trained in relevant low-acid canning issues	The BPCS was conducted on May 29-June 2, 2006; 8 topics were presented by Ukrainian lecturers (Dr.Myroniuk, Prof.Prytulska); 12 persons received training, including 2 from Georgia and 2 from Kazakhstan	
Eastern Europe/CIS Component: Management, Monitoring and Evaluation			
Branding	Verification that all Project-disseminated materials meet USAID branding strategy to the greatest degree possible • Copy of each Project-disseminated material available for donor review • Documented verification that all newly purchased equipment and supplies are appropriately branded	Canned Foods…. manual and BPCS manual are labelled with USAID logo	
South African Component: Project Objective # 1- Post Harvest Technology Center (PTC)			
Training Assessment Finalization and Curriculum Development	• Meeting with Cold Chain role players and WFLO representative is documented with representative's travel report • Finalized Training Assessment • Documented refinement of curricula by USt and WFLO involving at least one proposed course	• Meetings were held; WFLO reports are attached • Louw Hoffman flew to Orlando after seafood TTT to work with WFLO and develop curricula on Warehouse Management • During May visit (using non-project funds), WFLO discussed changes with industry • SUN and WFLO have developed the outline of at least 10 modules - these have been circulated to the industry, which have provided feedback	• Dr. Hoffman returned with a course content which will be evaluated by the industry • SUN and WFLO are setting a date for the first course (January 2007) and finalizing who will be delivering the course
Initial Course Conduct	Draft manual for Block man training is designed for expert or stakeholder review	Approximately ¼ of all that needs to be written is finished	The manual preparation was more work than initially anticipated
Game meat processing	Compile manual and hold course	Manual completed. First 3-day course given with following attendees: 2 white women, 3 black men, 3white men	

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
South African Component: Project Objective # 2 – Food Safety, Quality and Security Compliance			
Seafood HACCP TTT	Documentation for two participants completing Seafood HACCP TTT instruction	2 participants completed HACCP and Basic Sanitation TTT	
HACCP Baseline Study	Initiate Baseline study on game HACCP • Finalized protocol to determined technical feasibility • Documented compilation of initial data on game meat processing and export industry	• Protocol finalized • Initial data compiled and published in peer reviewed paper and results read at International Conference	
South African Component: Project Object #3 – Value Added Post-Harvest Technology – Cold Chain Technologies			
Evaluation and Selection	USt and WFLO evaluate suitability of four projects and document selection of at least one technology for case study analysis	Hot de-boning of ostriches selected as case study analysis.	
Case Study Design	Initialized case study methodology for the selected technology or technologies as verified by: • Outline or draft protocol describing how technical feasibility will be determined • Identification of at least one interested stakeholder	• Robert Dickson has visited site his report includes methodology • Swatland ostrich Abattoir identified as potential stakeholder and has accepted	
	• Finalized protocol describing how technical feasibility of hot de-boning of ostriches will be determined • Documented intent of participa-tion be at least one stakeholder (possibly through an MOU)	During a meeting between Stephen Shrewsbury from Swartland Abattoir and Prof. Dickson and Suné it was concluded that in-depth experimentation will have to be done to determine technical feasibility of hot-deboning and rapid chilling	• Currently it is low season (winter) for ostrich slaughtering. • All ostrich export halted due to outbreak of Avian H5N2 virus • Experimentation will start during the coming summer • Experimental protocol design is still pending

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
South African Component: Management, Monitoring and Evaluation			
Branding	Verification that all Project-disseminated materials meet USAID branding strategy to the greatest degree possible through: • Copies available for donor review • All newly purchased equipment and supplies are appropriately branded	• Game meat processing course work branded with appropriate logo. • All purchase equipment branded appropriately.	
Monitoring and Evaluation (M&E)	Documented Report of Dr. Hector Zapata's Economic Monitoring and Evaluation Trip regarding initial data collection and guidance on economic M&E for the Project	In process	
Nicaraguan Component: Project Objective # 1 – Food Safety, Quality and Security Compliance			
Institutional Establishment	Documented identification of Existing FSQO to be enhanced	Documentation about the Certification and Procedures Office (CPO, under MAGFOR's Department of Food Safety and Security) that will coordinate FSQ activities with the PFID-MSP project has been submitted to the LSU AgCenter	
	• MOU with FSQO (and organizational checklist if necessary) verifying appropriate organizational documentation • Determination of working terms between PFID-MSP and FSQO (and terms of organization if necessary)	Principal activities in the CPO's SOW include: • Program dissemination • Training programs for hotels and restaurants (standardization and certification) • Traceability norm creation • Support in traceability system implementation for slaughterhouses CLUSA and CPD (Certification and Procedure Department –MAGFOR) have shared activity documents to coordinate activities	• CPD already have program training activities with some slaughterhouses and plant inspections • There is a new policy direction named "Integrate Nicaraguan System for Food Safety" that arranged for representation from MAG-FOR, MINSA (Health Ministry) & MIFIC to start implementation next month.

Comment [JMH1]: Change if HZ's report comes through

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
HACCP TTT Program	At least three TTT candidates identified for each sector in travel reports of Drs. McMillin and Bell, of which two are selected for the seafood sector	• Dr. McMillin identified eight individuals with extensive HACCP experience as potential Train-the-trainer candidates for Meat and Poultry HACCP – to date, CLUSA has received CVs of four candidates • CLUSA Nicaragua identified three individuals as potential Train-the-trainer candidates for Seafood HACCP	Only one of the three Seafood HACCP TTT candidates (Sr. Erick Sandoval) was submitted and accepted by the AFDO and is scheduled to participate in the April course
	Participation of two stakeholders in Seafood HACCP TTT course documented for 11th SAR	Mr. Sandoval participated in Seafood HACCP TTT course	CLUSA and Mr. Sandoval met to coordinate in-country course, tentatively scheduled for September 2006
Nicaraguan Component: Project Object #2 –Post-Harvest Technology –Value Added Products			
Post-harvest technology selection	Travel report of post-harvest technology assessment trip identifying PHT possibilities is included in 11th SAR	Nothing to report at this time	Travel preparation has not be initiated due to budgetary constraints; CLUSA might have to assume primary responsibility to identify PHT possibilities
Nicaraguan Component: Project Object #3 – Plant-Based Training and Technical Assistance			
Application review and facility selection	Receipt and review of applications leading to documented selection of a participating stakeholder, including the following: • Justification of selection, based on qualifications, by CLUSA and WFLO • Contract or MOU with participating stakeholder	CLUSA sent an intention letter and a description of the TTA program to 8 companies	CLUSA received application forms from Pollo Estrella, Delmor S.A and Novaterra.
Benchmarking and goal setting	Scope of work outlining travel plans the WFLO field visit for WFLO specialists	Nothing to report at this time	Travel preparation has not be initiated due to budgetary constraints

Activity	Planned Indicators	Actual Results	Notes: reasons for deviation, corrective action, consequences, needed assistance from US partners, etc.
Nicaraguan Component: Management, Monitoring and Evaluation			
Branding	Verification that all Project-disseminated materials meet USAID branding strategy to the greatest degree possible: • Copy of each Project-disseminated material available for donor review • Documented verification that all newly purchased equipment and supplies are appropriately branded	All letters and final reports have the USAID correspondent brand (in Spanish).	
Capstone Programming Guidance	Travel report recommending programming directions	Report available in Annex F	

Annex B
FY 2005 Education, Training and Outreach Activities – Number of Beneficiaries

Based on their experience and accomplishments in Phase I, the Louisiana State University Agricultural Center (LSU AgCenter) and its partner institutions were awarded a second phase of operations under the Partnerships for Food Industry Development for Meat, Seafood and Poultry (PFID-MSP) Program. The LSU AgCenter elected to expand PFID-MSP's work in promoting Food Safety and Quality (FSQ) in former Soviet Republics in collaboration with the Ukraine-based International Institute for Food Safety and Quality. In addition, it expanded its work on FSQ and post-harvest technology to include Nicaragua in collaboration with that country's Cooperative League of the USA (CLUSA). It did the same in the Republic of South Africa, partnering with the University of Stellenbosch. In both of these countries, the World Food Logistics Organization (WFLO) provided technical assistance in cold chain issues.

In the target regions, the following activities will be conducted:

1) Central America (with initial emphasis on Nicaragua) – The objectives to be met in Central America in Phase II of the PFID-MSP Project include the following:
    - Promote food safety, security and quality through HACCP and compliance with recent U.S. legislation pertaining to food security. This area is addressed through training (particularly training of host-country nationals intending to be authorized HACCP trainers), consultations, HACCP compliance verification and policy advocacy; and
    - Promote value-added postharvest technology – this area includes identification, analysis and promotion of processing of alternative product and of cold chain technologies.

2) Southern Africa (with initial emphasis on South Africa). The objectives to be met in South Africa include:
    - Establish a Postharvest Technology Center (PTC) - the primary objective of this center will be to improve opportunities for value-added postharvest technology.
    - Promote food safety, security and quality through HACCP – this area is addressed through training (particularly training of host country nationals intending to be authorized HACCP trainers), consultations, HACCP compliance verification and policy advocacy; and
    - Promote value-added postharvest technology – this area includes identification, analysis and promotion of processing of cold chain technologies.

3) Eurasia/CIS – With initial emphasis on Azerbaijan, Georgia, Ukraine and Moldova, The objectives to be met in the Eurasia/CIS region include:

- Build on the Ukraine-based International Institute for Food Safety and Quality's (IIFSQ, an institute established as a result of PFID-MSP's Phase I activities) capacity to provide HACCP training.
- Present seminars on compliance with the U.S. Food Security Act of 2002.
- Through the auspices of the IIFSQ, establish a Better Process School to serve the fore-mentioned Eurasian region to facilitate approved FDA training and provide an acceptable methodology to eliminate serious food safety concerns related to low-acid canned foods.
- Expand into Azerbaijan and Georgia through the establishment in countries satellites of the IIFDQ to provide food safety awareness including support and capacity building. The program is also mandated to explore the possibility of PFID-MSP program in Kazakhstan.

Note that, during FY 2005 the PFID-MSP Project was concentrating on establishing a presence and assessment in South Africa and Nicaragua. Since Eastern Europe was the only target area where PFID-MSP was already established in FY 2005, all the participants recorded below are from that region.

Degree training completed	**Total**	**Male**	**Female**
PhD			
MS			
BS			
Degree training in progress			
PhD			
MS			
BS			
Non-degree training			
Professional training**	455	282	173
In-field training/workshops***			
Conferences/other outreach****	595	352	243
Total	1,050	634	416

* Figures are approximate; actual numbers probably somewhat higher.
** Professional training includes post doctoral studies, short courses, and technical workshops/conferences.
*** In-field training/workshops include farmer field schools, community training, farmer field days, and other training that does not build on professional studies.
****Conferences and other outreach are those events that do not fall into the above categories.

Short description of conferences and other outreach to be highlighted (below)

Professional training for FY 2005 includes the following activities:

- In October 2004, the IIFSQ Director participated in the state commission on graduate exams and diplomas involving sixty students (twenty men and forty women) at the Kyïv National University of Trade and Economics's (KNUTE's) Chair of Food Commodity Science and Expertise in Ukraine.
- Under PFID's livestock marketing activity during early 2005, Messrs. Petro Polishchuk and Ighor Koval from Ukraine, completed a specialized training course in livestock controls at the National Agricultural University
- On May 6-11, IIFSQ's Director General headed the State Exam and Diploma Commission at KNUTE's Department of Food Commodity Science and Expertise, and consulted seventy graduates (forty-five women and twenty-five men) whose diplomas included HACCP-related issues.
- On May 11-13 in Baku, the Commodity Certification Center (CCC) of the Azeri Ministry of Economic Development invited IIFSQ to give a seminar for basic certification (as recognized by the International HACCP Alliance) in red meat HACCP. The training was attended by fourteen individuals (thirteen men and one woman), primarily processors and regulators. The training was conducted on a cost-share basis; the CCC covered transportation and accommodation for IIFSQ trainers, and paid certificate fees.
- The Better Process Control School was conducted on May 31-June 3, 2005 in Kyiv, Ukraine. The School was attended by a total of eighteen individuals (thirteen women and eight men), including two from Azerbaijan, three from Georgia and two from Moldova (the Moldovan participants were selected by the MCFSQ). The lectures were presented by Dr. Michael Moody, Dr. Alfred Trappey and Ms. Tara Etheredge of the LSU AgCenter.
- As part of Dr. Michael Moody's visit to Ukraine in 2005, on-site introductory bio-security courses were conducted on June 7 in Illichivsk (Aquavit facility) and on June 10 in Berdyansk (Pocherk facility). At each location, Dr. Moody presented a seminar to a total of approximately twenty three facility personnel (nineteen men and four women) on "Food Plant Security". This one hour presentation provided introductory concepts on food processing bio-security concepts based on current published guidelines available through the US Food and Drug Administration and the US Department of Agriculture.
- A total of 14 certified Hazard Analysis Critical Control Points (HACCP) training courses were conducted in Moldova during 2005 by IIFSQ's Moldovan In-country Satellite for a total of 265 participants, including 70 women;

Conferences and other training for FY 2005 include the following:

- In October 20, 2004 PFID/Moldova conducted a seminar on the development of investment projects for thirty-three participants (including eight women), namely

industry representatives. At the seminar, the participants were provided with the following information:

  - The importance of business plans for the enterprises' strategic development – such plans should include financing for improving current operations and initializing new ones; and
  - Business plan development for attracting investment.

- IIFSQ provided four HACCP information seminars during early 2005 for a total of 138 participants (101 women and thirty-seven men).
- PFID/World Lab's promotion of the Livestock Wholesale Market Model throughout Ukraine in early 2005 included the conduct of three national seminars (with a total of 252 participants – 116 women and 136 men), one regional seminar (at Cherkassy Oblast with a total of 110 participants – fourteen women and ninety six men), one round table discussion and a series of mini-seminars in Zhytomyr, Khmelnytsk, Chernivtsi, Ivano-Frankivsk and Volhyn oblasts (with a total of 62 participants – four women and fifty-eight men).

LSU AGCENTER/INTERNATIONAL PROGRAMS/PFID

Project Activity Pictures and Success Stories Offered to Support Title XII Documentation, FY 2005

Prepared by Ganesh Sundarraj,
PFID Graduate Assistant

Model Livestock Market in Ukraine

PFID/World Lab interventions in the Model Livestock Market included assistance to the Charodiy Model Livestock Market in the diversification of its activities. Charodiy Market has been entered in the list of small business operators eligible for affordable credit under the Governmental Program of Small and Medium Enterprise support. PFID/World Lab assisted the Charodiy Market owner in developing a business plan to attract investment for reconstruction and expansion. This includes establishment of a slaughter and refrigerated over a three year period. This business plan was submitted to the Cabinet of Ministers of Ukraine. PFID/World Lab also facilitated allocation of three additional hectares to Charodiy through requests to the Ag Ministry, facilitation of officials' field trips to Charodiy and negotiations with local authorities.

BPCS in Ukraine

The BPCS was conducted on May 31-June 3 in Kyiv, Ukraine. The School was attended by a total of eighteen individuals, including two from Azerbaijan, three from Georgia and two from Moldova (the Moldovan participants were selected by the MCFSQ). The lectures were presented by Dr. Michael Moody, Dr. Alfred Trappey and Ms. Tara Etheredge of the LSU AgCenter. The course was also supervised and evaluated by Dr.Bradley Taylor of the Food Processor Institute and Dr. Donald Greaves of FDA, the certifying governmental agency for all BPCSs.

The BPCS was preceded by extensive preparatory activities, including acquisition of FDA approval, publicity, translation (refer to the manual cover above), selection of participants and logistical arrangements. To assist in selecting participants, the IIFSQ received a list of regional canneries registered within FDA and sent invitations to the registered Ukrainian facilities.

Breeze Success story

Breeze Ltd. is one of the leaders in the Ukrainian fish industry and has been exploring the potential of external markets. The IIFSQ has trained twenty-four Breeze specialists and helped Breeze develop a HACCP plan and improve its facilities' sanitation control. In 2005, Mr. Matveyed designated the EU market as his new target market. Adoption and adherence to international standards made Breeze eligible to receive the European Veterinary Certificate and become the first Ukrainian fish processor approved to export to the European Union.

The HACCP system contributed to increased processing efficiency in that it redirects efforts to the processing steps where they yield higher returns. HACCP's positive effect on product quality also yields a higher price; at a volume of 5,277,000 cans of various products in 2005, Breeze sells them at price up to 30% better (1.5 UAH or $0.30) than its competitors, without any decrease in demand.

In increasing access to global trade through higher standards of food safety management, Breeze and the IIFSQ gave all other national processors a pattern to follow; that what is needed is to offer a product that would be readily accepted in western markets.

Annex C - Evaluation Report

International Institute for Food Safety and Quality

EVALUATION DETAILS

Evaluation Details				
Name of Certification Body:				
Evaluator:	Evaluation Date:		Date of Previous Evaluation:	
Company Name:				
Address:				
Postcode:		Country:		
Tel. No.		Fax. No.		
Email address:				

Scope of Evaluation

Key Personnel				
Name/Job Title	Present at Evaluation (✔)			
	Opening Meeting	Site Inspection	Procedure Review	Closing Meeting

Company Profile	
Duration of on-site evaluation (Man Hours)	
Reasons for deviation from expected on-site evaluation duration	

Evaluation Report

NON-CONFORMITY SUMMARY SHEET

List of Non Conformities

Critical Or Major Non Conformities Against Fundamental Requirements

No.	Requirement ref.	Detail of Non-Conformity	Critical or Major?	Anticipated Re-evaluation

Other Non Conformities

Critical

No.	Requirement ref.	Detail of Non-Conformity

Major

No.	Requirement ref.	Detail of Non-Conformity

Minor

No.	Requirement ref.	Detail of Non-Conformity

Evaluation Report

Detailed Evaluation Report			
Requirement No.	**REQUIREMENT**	**Conforms** **Y, N Or N/A**	**Details**
1 HACCP SYSTEM			
1.0 FUNDAMENTAL Statement of Intent	**The basis of the Company's food safety control system shall be a HACCP plan which shall be systematic, comprehensive, thorough, fully implemented and maintained, and shall be based on the *Codex Alimentarius HACCP* principles and reference shall be made to relevant legislation, codes of practice or guidelines.**		
1.1	HACCP shall have senior management commitment and shall be implemented through the company's quality management system.		
1.2	The HACCP system shall be developed, reviewed and managed by a multidisciplinary team. In the event that the company does not have the appropriate expertise, in-house external expertise shall be sought and used to develop and review the HACCP system, but the day-to-day management shall remain the responsibility of the company.		
1.3	The HACCP team leader or nominated team representative shall be able to demonstrate competence in the understanding of HACCP principles and their application.		
1.4	Key personnel identified as HACCP team members shall have adequate HACCP training and appropriate experience.		

Annex D

Relevant Information for South African "Block Men" Training Courses

The 12 Units Standard Titles to be written by PHTC

1) ID – 9042 – Demonstrate an understanding of food or beverage safety practices and procedures in the food or beverage manufacturing environment. (Busy – delayed)

2) ID – 8803 – Demonstrate an understanding of heating and cooling procedures. (Busy – delayed)

3) ID – 8905 – Form or fill raw minced fish or meat products using automated equipment.

4) ID – 9053 – Salt and dry fish or meat. (Completed)

5) ID – 8870 – Demonstrate an understanding of the relationship between micro-organisms and food spoilage. (Completed)

6) ID – 15239 – Identify and deal with factors influencing meat quality. (Completed)

7) ID – 9054 – Coat or dip a food product using automated equipment. (Busy)

8) ID – 8766 – Mix or blend food raw materials for processing using automated equipment.

9) ID – 8765 – Pre-batch food raw materials.

10) ID – 8923 – Manufacture cured fish or meat products. (Busy)

11) ID – 8906 – Manufacture emulsified meat products. (Busy)

12) ID – 9052 – Smoke fish or meat. (Completed)

Learning Assumed to be in Place

It is assumed that participants in the fore-mentioned units are already competent in the following at NQF level 2:

- Cleaning procedures, handling of equipment and chemicals.
- Knowledge of the anatomy of relevant animals.
- Energy principles.
- Knowledge of heating and cooling media in a food manufacturing environment.
- Introduction to food microbiology.
- Principles of chemistry and physics.
- Principles of microbiology.
- Hygiene and food safety.

- Occupational health and safety.
- Principles of sensory evaluation of meat products.
- Quality assurance practices and procedures.
- Quality assurance principles.
- Representative sample taking for quality control purposes.

Annex E - Research Project Proposal

Ostrich and Hot De-boning

Prepared by Robert Dickson, WFLO;
Italicized comments by Suné Botha, PHTC

1) The post harvest to packaging time and temperature rate of reduction curve for individual muscle masses must be determined, measured and plotted. Some of the larger muscles may need to be packed in larger wholesale portions and may need special cooling treatments to attain proper end-point temperature thresholds.

   During my M.Sc. study, I measured the time (approximately) from slaughter to boning and packaging for hot-deboned muscles to be between 4 and 5 hours (after which the temperature of the two muscles investigated, varied between 10ºC and 26ºC).

   For this, one cannot investigate all the major individual muscles in the time frame Dr. Dickson suggested. However, the pH and temperature reduction curves can be determined for 4 major muscles with the use of the pH/temperature data loggers as used during my M.Sc. study.

2) Once packaged, the time and temperature rate of reduction curve in the package will need to be determined. Additionally, aerobic and anaerobic bacterial critical limits will need to be determined for proper food safety management.

   From here, after packaging, it will be necessary to measure the time and temperature rate of reduction for individual muscle masses (as packaged for export and retail sector) to determine which muscle masses would need additional cooling treatments to attain proper end-point temperatures (7ºC) before ending up in boxes in the refrigerated storage. From this one can start to determine the length of time and at what temperature these muscle masses would need to be cooled in addition. From this one can design a cooling system … conveyor belt as suggested by Dr. Robert Dickson and Steven from Swartland Abattoir.

   In the packaged muscle potions, one can follow the temperature decline with the new individual data loggers (purchased from Prof Hoffman's research fund), as well as with the pH/temperature data loggers (put within the muscle) as used in my M.Sc. to determine the difference in temperature with the two different types of data loggers. The time frame for this data collection period will depend on how many different muscle-cuts, packaged with different masses, there are to investigate; as well as the amount of data loggers (10 temperature loggers) available.

3) In order to assure that any cooling processes interventions used do not have a negative affect on tenderness and/or texture and eating quality, the following measurements will need to be made.

   a) Warner-Bratzler shear values for tenderness. *After step 2) as described above and at the end of refrigerated storage of 10 or 21 days.*

b) pH measurements to assure electrical stimulation is doing its job. *Ostrich carcasses do not receive electrical stimulation (the fast pH decline and onset of rigor-mortis negates this)*

c) Muscle Color scores
   i) At boning
   ii) At the same time as micro evaluations are done on packaged materials. *Micro samples after cooling to 7ºC and after storage of 10 or about 21 days.*

d) Final microbiological plate counts going into the package compared with microbiological plate counts during various times post packaging to determine if product properly holds up during transportation. These shelf life evaluations should be made 0, 1, 4, 7 and 10 days post-processing.

   This kind of investigation has been done during my M.Sc. study. However, for completion, microbial plate counts for Pseudomonas, Enterobacteriaciea, and Total Aerobic Counts, will need to be determined for the different packaged meat-cuts. Since the Animal Science Department does not own a microbiological laboratory, samples would need to be sent away for analysis.

Annex F
Combined Technical Assistance Narrative: May – June 2006
List of Trip Reports

1. A Study of Getting Small and Medium-Size Processors' Products to Market, May 24, 2006 by Rebecca Ray and Megan Schildgen, GW Capstone Team

2. Cold Chain Technologies Program (Republic of South Africa): Stakeholder Analysis Report, May 2006 by Robert Dickson, WFLO

3. Training Needs Assessment: Cold Chain Training Course for South Africa, May 2006 by Lorien Onderdonk and Corey Rosenbusch, May 2006

4. Report on a LSU AgCenter/KNUTE University (Kyïv, Ukraine)-based Better Process Control School, May 30-June 2,2006 by Stephen Spinak

5. A report on a Better Process Control School conducted on May 30-June 2,2006 in Kyïv, Ukraine through LSU AgCenter/KNUTE/IIFSQ by Joseph Schlegel

Partnership for Food Industry Development (PFID) in Nicaragua

A study of getting small and medium-sized processors' products to market

May 24, 2006

Rebecca Ray

Megan Schildgen

ACKNOWLEDGEMENTS

Our work would have been impossible without the contributions and hard work of many colleagues. First, it should be noted that Dr. Lakshman Velupillai, Director of International Programs at the Louisiana State University AgCenter, took the unusual and arguably risky step of taking time to meet with us and consider our proposal during a Fall 2005 trip to Washington, D.C. His openness to our work, faith in our abilities, and generous financial support of our travels were invaluable and are deeply appreciated. Jonathan Hubchen, PFID Program Coordinator at the LSU AgCenter, worked diligently to provide us with every possible resource and document from the PFID archives, ensuring that we would arrive in Managua well-equipped to analyze the Nicaraguan situation in light of PFID's earlier successes. He has our most sincere appreciation. We also warmly thank Tania Casaya, program staff at the Managua office of CLUSA-Nicaragua, worked wonders in coordinating a seamless itinerary of interviews and tours for our team. Countless, crucial informants from the private, public, and non-profit sectors gave us hour upon hour of their valuable time, without which this project would not have been possible. Finally, we extend heartfelt gratitude to the Elliott School of International Affairs, and specifically, to Dr. Inder Sud. The Elliott School generously offered to partially subsidize our travel expenses, making the project possible. Dr. Sud provided invaluable insight, guidance, and support at every turn. For so much from so many, we are truly grateful.

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TABLE OF ACRONYMS

CAFTA	U.S.-Central America Free Trade Agreement
CLUSA	Cooperative League of the USA
CONAGAN	Comisión Nacional de Ganaderos (National Cattlemen's Association)
FAS[1]	Foreign Agricultural Service
FSIS	Food Safety and Inspection Service
GON	Government of Nicaragua
HACCP	Hazard Analysis and Critical Control Point
IDB	Inter-American Development Bank
JICA	Japan International Cooperation Agency
LSU	Louisiana State University
MACESA	Matadero Central, S.A.
MAGFOR[2]	Ministerio Agropecuario y Forestal (Ministry of Agriculture and Forestry)
MIFIC	Ministerio de Fomento, Industria y Comercio (Ministry of Development, Industry, and Commerce)
MINSA	Ministerio de Salud (Ministry of Health)
NGO	Non-Governmental Organization
PFID	Partnership for Food Industry Development
RAAN[3]	Región Autónoma Atlántico Norte (Northern Atlantic Autonomous Region)
RAAS	Región Autónoma Atlántico Sur (Southern Atlantic Autonomous Region)
RSJ	Río San Juan Department
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

[1] FAS and FSIS are USDA Agencies.
[2] MAGFOR, MIFIC, and MINSA are all Ministries within the Government of Nicaragua.
[3] RAAN, RAAS, and RSJ are departments, or states, of Nicaragua.

EXECUTIVE SUMMARY

This paper explores the challenges and opportunities faced in getting small and medium-sized meat processors' products to market in Nicaragua, as related to the development model presented in the Partnership for Food Industry Development (PFID) model used by the Louisiana State University Agricultural Center. In doing so, we provide background on the meat processing industry in Nicaragua, describe the current local situation, and explore how the nature of the meat processing industry affects local farmers and consumers. Then, we describe the PFID program and identify constraints faced by small meat processors in Nicaragua. Our primary research questions for fieldwork in Nicaragua include the following:

- What can be done to help small processors tap the bigger market in Nicaragua?
- How big is a medium-size processor in Nicaragua? Which processors should PFID target first?
- Are there ways for them to take advantage of new opportunities presented by CAFTA?
- Are there ways to protect them from the dangers presented by CAFTA and the larger processors' incursion into the small processors' traditional markets?

We explored these questions in meetings with eight meat processing plants (four large, private plants and four small, municipal plants), and with government and NGO representatives. Conclusions from these meetings fall into two categories: targeting appropriate PFID beneficiaries and identifying ways in which PFID can help these processors overcome current obstacles.

Appropriate Beneficiaries

PFID aims to benefit small and medium-sized processors. In that light, we sought to identify Nicaragua's medium-sized beef processors, as well as any small processors whose needs and capacity make them appropriate PFID beneficiaries. We quickly discovered that there are very few medium-sized processors. The overwhelming majority of the country's meat processors are individual meat vendors whose small teams of employees use municipal slaughterhouses to process animals. Although these "artisan" processors and the public facilities where they work face many food safety obstacles, we recommend that PFID work with a few of the largest and best-equipped of them, who have shown their ability and willingness to invest in needed technology and staff training. Specifically, of the four municipal slaughterhouses we visited, we found the small processors in Chinandega, Masaya and Granada to meet these criteria, while those in León did not. We believe that the municipal slaughterhouse of Managua, the largest in the country, may also meet these criteria, but we were unable to visit that facility. We recommend that PFID staff tour the largest ten municipal facilities, in order to work with as many appropriate partners as possible.

The few privately-owned slaughterhouses in Nicaragua are generally large plants that already have export certification and HACCP teams, and face no food safety barriers whatsoever. In fact, Proincasa is the only private processors currently dedicated to the domestic market. Even though Proincasa's management is not currently interested in exporting, the plant does face some

food safety barriers to domestic market expansion, and thus may make an appropriate PFID beneficiary.

Food Safety Obstacles

The processors we recommend as potential PFID beneficiaries have all shown their willingness and ability to invest in food safety improvements. However, as none of these inspectors are currently exporting, they do not have full-time MAGFOR inspectors overseeing their production, and thus need guidance in food safety. We have identified three major areas in which we feel PFID can effectively help these processors improve their practices and expand their markets. First, PFID can work with government representatives to expand inspection services. MAGFOR has recently received a sizeable loan from the InterAmerican Development Bank to expand and modernize their services; we feel that now is the time to approach MAGFOR about expanding their inspections to serve non-exporting processors. Secondly, we recommend that PFID offer these processors expertise in infrastructure upgrades, both in finding financing for the new investments, and in operating maintaining the new equipment. Finally, PFID can work with local university faculty to improve food-handing training for processor staff, through a Train-the-Trainer network. By improving standards and capacity through these three approaches, PFID can bolster small and medium-sized processors in Nicaragua and help them face the increasing competition from industrial processors and CAFTA.

BACKGROUND

In order to understand the current situation in the meat processing sector in Nicaragua, it is essential to understand its history and context. This section will discuss the history of the meat processing sector in Nicaragua and its current state, focusing on issues related to ownership and production. This section will also identify how the meat processing industry, as is, affects small farmers and consumers in Nicaragua.

History of meat processing in Nicaragua

Cattle ranching has sustained the Nicaraguan economy since early in its colonial history. Conquest and the slave trade dramatically reduced the country's labor pool, leaving landholders to pursue ranching due to its low labor requirements. By the seventeenth century it became the strongest element of the colonial economy (Biderman, 9). The twentieth century saw coffee surpass the economic importance of beef, but the latter remains a vital source of revenue and mainstay of the Nicaraguan culture. Currently, over one-third of Nicaragua's surface area is dedicated to cattle, and 49% of Nicaraguan farms raise some cattle (Schütz).

The latter half of the twentieth century has seen ranching move quickly into remote areas. This expansion was spurred by the introduction of exported, refrigerated Nicaraguan beef cuts to the U.S. market, where demand soared after World War Two (Biderman, 17). As ranchers sought to use this newfound revenue to expand their production, they found that purchasing new land was less expensive than upgrading current pasture to support more cattle (Schütz et al., 22). As a result, from 1960 to 1979, Nicaraguan pasture land doubled (Biderman, 17). However, as this expansion far outpaced the growth of the nation's highways, ranchers have become isolated from

both markets and processing plants. Middlemen, often in the employ of slaughterhouses, stepped in to fill this gap. According to Biderman (18) ranchers found themselves "dominated" by intermediaries, processors and exporters, creating an imbalance of power and distortion of the market.

This new resource became a central weapon in the civil conflict of the 1980s. In 1979, at the eve of the war, the dictatorial Somoza dynasty owned between 10 and 20 percent of the country's arable land and the majority of the seven exporting slaughterhouses. (U.S. Department of the Army and Biderman, 18). Several slaughterhouses were nationalized under the Sandinistas, and then shuffled between private and public ownership as successive presidential administrations counteracted each other's reforms (Everingham, 72). This tumult left the industry suffering from financial and managerial instability, unable to plan for long-term solvency.

The 1990s brought financial crisis most of these plants, and the closure of over half of them. The end of state-funded credit, a steep drop in worldwide beef prices, and Hurricane Mitch came in rapid succession. Of the nine privately-held slaughterhouses in operation at the beginning of the 1990s, only three remained by the early 2000s. Of these three, two were now co-owned by banks, which allowed them to buy out their folding competitors (Schütz et al., 15). The consolidation of slaughterhouse ownership into just three large companies intensified the above-mentioned imbalance of power between ranchers and processors.

Current state of the meat industry in Nicaragua

Ownership

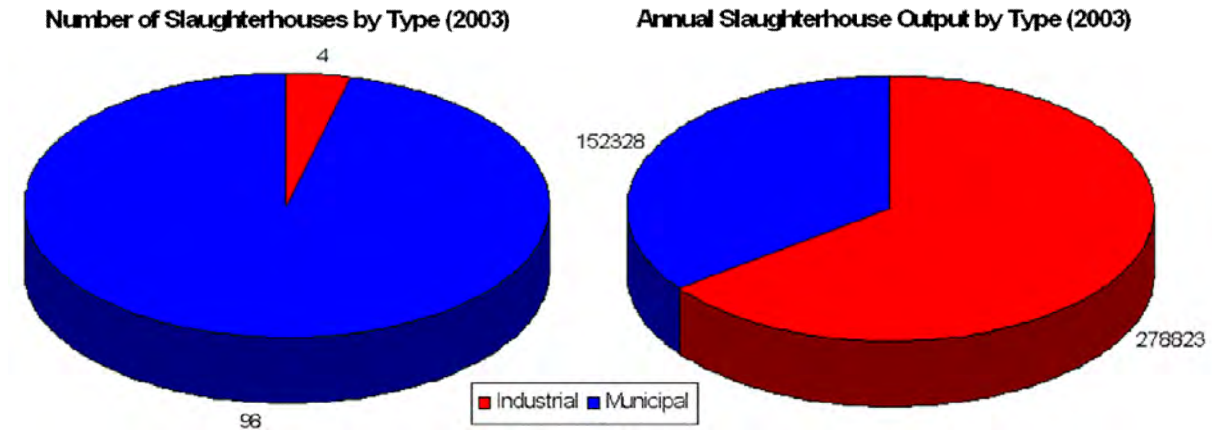
Three types of slaughterhouses exist in Nicaragua: industrial, municipal, and clandestine plants. Industrial (or privately-owned) slaughterhouses, mentioned above, oversee most beef processing in the country. They often employ the intermediaries who purchase cattle from remote ranches and therefore retain most of the added value in the chain of production. Though only five such plants currently operate in Nicaragua, in 2003 they processed almost two-thirds of the cows slaughtered nationwide (Schütz et al., 16). All five industrial slaughterhouses are located in the more developed, western half of the country and sell their products primarily to urban supermarkets, although they have begun to encroach on the traditional municipal slaughterhouses' customers: local traditional markets. This dominance is codified by Nicaragua's 1987 Decree 158 (*Ley de defensa del patrimonio ganadero de Nicaragua,* or "Law in defense of the value of Nicaraguan livestock"). Decree 158 specifies that only industrial slaughterhouses may export beef, or process any cows considered appropriate for beef production. Specifically, the only cows that other slaughterhouses may process are those that are too old, underweight, deformed, or injured to be desirable beef cows (República de Nicaragua).

Secondly, 98 municipalities own public slaughterhouses. As noted above, municipal slaughterhouses may only process sub-standard cows. Most municipal slaughterhouses do not buy and sell animals; rather, local meat vendors bring cows to the plants and pay for processing services. Furthermore, although Decree 158 requires government inspection of all processing plants, their number and isolation prohibit most such inspections. Schütz et al. (12) describe their management in the following way:

> *Probably, the term "business" does not apply to the majority of these establishments. … Many installations lack the minimum necessary facilities for hygienic treatment of the carcasses, and for guaranteeing a safe product. … Of the 98 slaughterhouses only the largest, in the state capitals, work under the control of the Animal Health Division of the Ministry of Agriculture. The other smaller ones, which kill perhaps five or ten animals per week, operate with no public oversight.*

Traditionally, municipal slaughterhouses were the sole providers for local meat vendors. Since most of these facilities have no refrigeration, they tend to process the beef in the evenings so that it is ready to be sold when traditional markets open before sunrise the next morning (Schütz et al., 5-6). However, industrial slaughterhouses are increasingly becoming dominant providers to these vendors (in urban areas) for two main reasons. First, with the proliferation of supermarkets have come consumers demanding higher quality beef, only available through industrial plants. Second, some industrial slaughterhouse have hired distributors to court the local vendors, offering the added convenience of already-processed meat. Consequently, many local vendors have become simply retailers for these plants (ibid. 6). The result has been a dramatic growth in the market share owned by industrial slaughterhouses. As Figure 1 illustrates, since the crises of the 1990s, all the new gains in meat processing have gone to industrial plants. Thus, municipal slaughterhouses represent an important, traditional part of the meat processing industry, but one that is waning in importance (ibid. 15).

Figure 1: Slaughterhouse Output and Ownership, 2003



Source: Schütz et Al., 16.

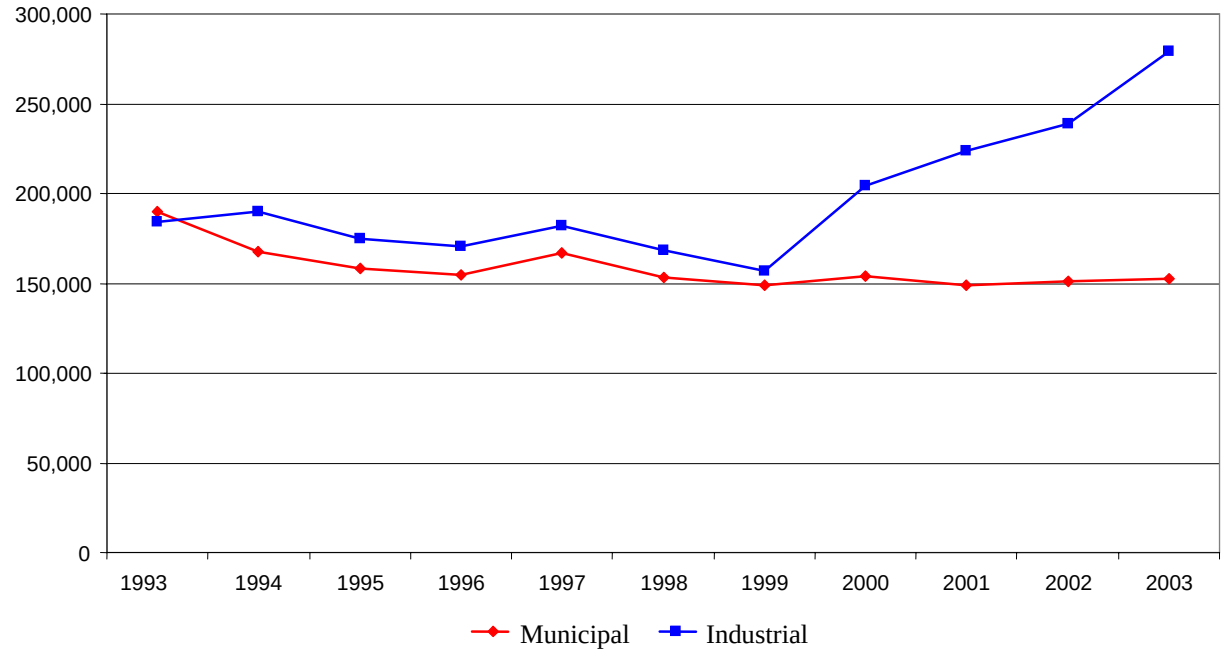
Finally, clandestine slaughterhouses outnumber all other beef processing plants combined. Pomareda et Al. (34) estimate that between 300 and 600 such illegal locations operate currently in Nicaragua. Since all but sub-standard cows must be processed by industrial slaughterhouses, which in turn sell only in urban areas, rural consumers have little legal access to very beef they produce. It is little wonder that illegal sites have sprung up to fill this demand. Pratt and Pérez (9) attribute the proliferation of these illegal sites to "the cost associated with the payment of taxes, permits, transport, and processing costs [of legal venues]… that make the product more expensive and leave minimal earnings for the small producer." No official statistics trace the

output of such plants, but the Health Ministry estimates that up to 12,000 pounds of completely unregulated beef circulate at any given time due to this phenomenon. (ibid. 8).

Production

Nicaragua's beef sector is a main source of revenue for the country. Total exports from Nicaragua in 2005 were valued at almost $858 million, with 12 of the top 15 export commodities pertaining to the agricultural sector (Banco Central de Nicaragua, 2005a – see Figure 2). Within total exports, the beef industry produced over $119 million in exports in 2005, only slightly trailing the top-ranked coffee industry (Banco Central de Nicaragua, 2005a). The beef industry is among the few productive industries in Nicaragua, as reflected by its dominance in the Nicaraguan export market. However, slower growth is expected in meat sector production in the coming years, due to lack of government policies to support producers, high interest rates offered by private banks (18%), high taxes, high production costs, and poor road infrastructure (USDA-FAS, 2003, 1).

Figure 2: Cattle Harvesting by Slaughterhouse Type

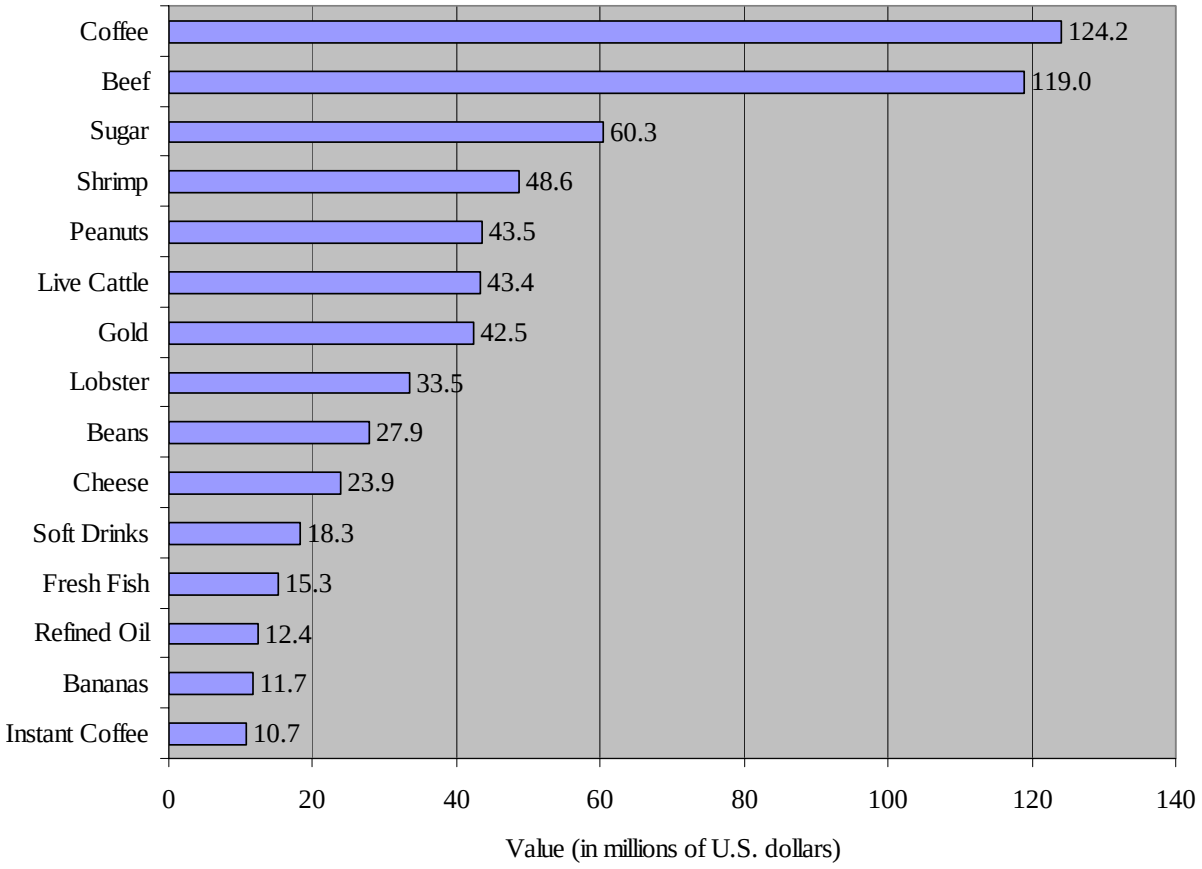


The beef sector in Nicaragua also represents an overwhelming source of livelihood. Specifically, approximately 120,700 on-farm jobs are attributed to cattle production and 3,000 jobs pertain to the meat processing industry (including both municipal and industrial slaughterhouses) (Schütz et al., 21). Considering Nicaragua only has a total workforce of 1,697,900 jobs, these 123,700 jobs created by the meat sector thus represent 7.3% of employment in Nicaragua (Banco Central de Nicaragua, 2005c).[4] Of note, these figures do not take into account the jobs that are created due to the meat production and processing industries but are not directly a part of them, such as cattle transport, marketing, sales, and infrastructure (such as refrigeration, in industrial

[4] 2001 total employment figures.

slaughterhouses), to name a few. The figures also do not take into account informal jobs related to meat production and processing, particularly those in the clandestine processors. Given these considerations, Núñez (2005) estimates that livestock as a whole creates 600,000 full-time jobs in Nicaragua and contributes to 10% of the country's gross domestic product. Thus, regardless of whose figures one considers, it is apparent that the meat sector is not only a strong source of production and exports, but also provides livelihood for a sizeable portion of Nicaragua's population.

Figure 3: Nicaragua's Top 15 Export Commodities



Source: Banco Central de Nicaragua, 2005a.

Nicaragua's focus on beef production is not a new trend. Cattle farming has been a fundamental economic activity in Nicaragua for 150 years and is culturally tied to the roots of the country. Beef export data has been recorded in Nicaragua as far back as 1887, when it exported 1,207 head of cattle (Cruz). In the early 1990s, beef production for the local market in Nicaragua exceeded exports. However, throughout the 1990s, the amount of Nicaraguan beef that went to the export market passed the local market and has continued growing (Schütz, et al., 4).

Impact of the US-CAFTA on Nicaraguan beef producers

The US-CAFTA (United States-Central America Free Trade Agreement) will certainly have direct impacts on the Nicaraguan meat production and processing sectors, potentially positive and negative. Prior to CAFTA, Nicaraguan policies greatly protected local beef producers, with tariffs of 485% on incoming beef products (Pratt and Pérez, 23). Such protectionist policies may hurt beef producers and processors with the emergence of the CAFTA, as they did not inspire efficiency or increased production for the local meat sector, both of which are necessary with increased foreign trade (Pratt and Pérez, 23).

There are a number of ways the CAFTA can benefit the Nicaraguan meat sector. Per CAFTA, Central American countries agreed to the immediate elimination of tariffs on U.S. prime and choice cuts because the beef exports traditionally relied upon by their producers are industrial cuts. In turn for this concession, industrial cuts have been backloaded with CAFTA; in short, this indicates a slow, phased tariff reduction over the next 15 years for U.S. industrial cuts entering Central America, with no reductions in the early years (USDA-FAS, 2005 and Hornbeck, 20). This is critical to Nicaraguan industrial exporters because it will give them an advantage in Central American export markets in the short-run and will allow them to make necessary adjustments gradually over the next 15 years, rather than immediately. For Nicaraguan producers that have equivalence with the United States' stringent food safety standards, the CAFTA will provide easy access to the much bigger U.S. market. Also, lack of animal disease issues will provide a comparative advantage to Nicaragua in beef products, relative to countries in South America where foot-and-mouth disease hinders beef trade with the United States (Pratt and Pérez, 3).

However, CAFTA has its drawbacks for the meat sector and does not provide an ideal situation for all producers and processors. Locally-run businesses, especially small firms and those that do not meet U.S. import standards, face considerable threats due to U.S. products entering the market and putting them out of business due to the economies of scale advantages U.S. producers enjoy. Also, considering that Nicaraguan law does not allow the smallest processors (municipal slaughterhouses) to process high-quality animals, this could pose a great threat for them because producers will (and do) send their animals much further so they can access a bigger market. Addressing the incentives issues related to ownership and market structures in the Nicaraguan meat processing sector and the problems small producers face is critical. We will further discuss their challenges later in this paper.

Development Implications of the Current State of the Industry

Impact on farmers

As noted above, industrial slaughterhouses have been rapidly gaining market share, and have accounted for all of the growth in the cattle industry over the past five years. However, these gains are not necessarily reaching farmers. Most Nicaragua livestock are concentrated far from municipal centers, and therefore most cattle ranchers cannot take advantage of auctions to raise the price of their cattle. This situation has worsened as industrial slaughterhouses consolidated into fewer hands in the 1990s. At the start of the decade, nine processing plants operated in seven different cities. The five remaining plants operate in only three cities, with most of them in Managua.

Most Nicaraguans with cattle farm on a near-subsistence basis, with "double purpose" farms producing a variety of crops and milk (Schütz et al., 19). Double purpose farms sell their young bulls for cash, but do not produce enough of them to allow for the purchase of trucks. Therefore they must rely on intermediaries for transportation. *Colectores* travel among farms buying 120-180 kg cattle for cash, with prices based on imprecise estimates of weight. The *colectores* then sell to *acopiadores* (larger ranches that also serve as businesses, and often employ the *colectores*), which raise the cattle until maturity (280-300 kg). *Engorde* ranches then buy the cattle, fatten them as much as possible before they pass prime age, and sell them to *comerciantes* (slaughterhouse buyers), who deliver them for processing (ibid. 26). Each purchase takes an animal closer to the urban centers where industrial slaughterhouses are located.

Because *acopiadores* are large enough to own vehicles, they can get higher prices for their cattle by waiting and selling them directly to *comerciantes.* Small double-purpose farmers, however, do not have this ability and must accept the going price for their cattle. Therefore, the chain of beef production serves to concentrate added value within those already well-established, and leaves families who are in the most precarious position vulnerable to market fluctuations and the availability of *colectores.* Local municipal slaughterhouses can only partially alleviate this situation. Double-purpose farmers gain some income by selling their old milk cows locally through these plants, but the resulting meat is far too tough for most uses and yields a very limited income (ibid. 13).

Impact on consumers

The expense and location of industrial meat processors means most rural and lower-class consumers have no access to their products. Indeed, those parts of Nicaragua with the highest concentration of cattle have the lowest availability of industrially processed beef (Schütz et al., 22). Small towns have only municipal slaughterhouses, which have enough legal oversight to limit their production (through Decree 158 and their public ownership), but not enough oversight to receive regular health inspections. As clandestine slaughterhouses surge to fill this vacuum in the market, public health suffers dramatically. Pratt and Pérez (24) describe the phenomenon as follows:

> *The breaking of sanitary regulations by a perverse economic stimulus (the high cost of processing) created health problems in the population that finds itself exposed to consuming food without the necessary animal control. The process of slaughtering the cattle provides sources of protein the population needs, but the lack of appropriate technology in most of the slaughter sites creates results in wasted animal by-products. Economic resources are lost that could be harnessed, and at the same time pollution problems are being generated, the cleanup or mitigation of which will be very costly.*

Indeed, the *Agence France-Presse* recently cited scientific studies directly linking Nicaragua's extremely high infant death rate to water pollution, which in turn was directly linked to slaughterhouse dumping. These public health problems are exacerbated by the fact that clandestine slaughterhouses are not limited to rural areas, but exist even within Managua. The possibility to save money by avoiding taxes and fees associated with legal meat processing makes illegal slaughter cites very difficult to eradicate. Market vendors must show, on demand,

certification that their product came from an inspected plant. However, markets open as early as 4:00 AM, long before Health Ministry officials begin their rounds, and market stands can be replenished as the day continues. Therefore, it is nearly impossible to prove whether a vendor has sold more meat than his paperwork accounts for (Schütz et al., 5-6). The prevalence of uninspected meat and illegal animal byproduct dumping, within this urban environment, is unsustainable and dangerous.

Currently, the scenario includes unnecessary inefficiencies in transport costs and endangers consumers through exposure to unsafe food. Eliminating clandestine and uninspected slaughterhouses and black-market meat, and allowing beef to be processed safely and legally in rural areas could be instrumental in improving rural income and public health. Improving the safety and production levels of existing small, legal processing plants is an indispensable part of this process.

PROBLEM STATEMENT

We seek to analyze the Partnership for Food Industry Development model and necessary modifications for the Nicaragua case, considering the challenges that exist for small processors to tap a bigger market.

PFID PROGRAM

Program History and Background

Louisiana State University (LSU) AgCenter's Partnership for Food Industry Development (PFID) program was first funded by the United States Agency for International Development (USAID) in 1998 for work in the Ukraine and Moldova. This program dealt with a variety of processed food products, including fruits, vegetables, meat, poultry, and seafood. Due to the nature of the former Soviet system and the newly privatized economies in both countries, the program worked with a large part of the food chain, including the parts preceding and following the actual food processing part of the chain. The PFID program aimed to involve all players in the processed food industry based on a partnership concept between industry, government agencies, consumers, and local universities. The specific activities under this program provided a forum in which the aforementioned players could discuss and collaborate on issues related to the food safety challenges their country and respective industries faced.

In early 2004, USAID increased funding to LSU to expand its program to Southern Africa. However, when applying their Ukraine/Moldova PFID model to Southern Africa, LSU found that many local differences in the food processing industry created the necessity to alter its model for the local circumstances.

In late 2004, the PFID program expanded to Nicaragua. To date, assessments have been conducted, partners have been identified, and activities are planned to start in 2006. However, considering the gaps they found between the local situation and their model in the initial

Southern Africa case, LSU suggested that we study the local situation and conduct in-country fieldwork so they may tailor their program, where necessary, to best meet their goals and best serve the recipients in Nicaragua.

Program Goals

In order to identify how PFID may best meet its goals, we must first define them. LSU's main PFID goal is

> *to support partnerships that contribute to the economic growth of client countries by mobilizing private and public sector expertise to add value, as well as meet safety and quality standards, in the production of food products for domestic and international markets of USAID client countries.* (LSU AgCenter, 2006a)

The PFID website, managed by LSU AgCenter, also notes the programs relation to USAID goals. Specifically, PFID complements USAID efforts to promote market-led diversification and trade opportunities by *strengthening business capability of small and medium-sized agro-processing enterprises* and *improving quality of processed agricultural products, leading to increased sales and employment* (LSU AgCenter, 2006a).

Our research will focus on the issues touched on in these goals, which represent the core of the PFID program. Our research questions, identified later in this paper, will specifically focus of the overarching goal themes related to reaching small and medium-sized agro-processors, and its focus on increasing market access.

Program Themes[5]

In order to reach these goals and implement this program, LSU has identified five themes as important ways to utilize the PFID mechanism effectively. These themes include the following: 1) awareness programs in the industry, 2) development of support mechanisms and networks, 3) support for post harvest/processing technologies and regulatory compliance, 4) capacity building for industry training and collaborative research, and 5) business partnership development (LSU AgCenter, 2006a and LSU AgCenter, 2000, 1).

1) Awareness programs in industry

The main objective of this theme is trust-building among partners. Awareness is a necessary for all stakeholders and beneficiaries to understand the program, and is a precursor to success as the program continues and develops. In order to build trust and awareness, PFID typically holds a meeting of key stakeholders and conducts training in a workshop format. These formats are preferred because they are believed to provide a safe and productive environment to identify common problems and discuss possible solutions.

2) Development of support mechanisms and networks

Another theme is the development of support mechanisms and networks. This theme seeks to identify what local support mechanisms are, why are they needed, and how the can contribute to

[5] Information throughout this section is drawn from LSU AgCenter (2000), pp. 1-7. Direct quotes are noted.

the country's effectiveness in regulating their own food industries and participating in global negotiations on food trade.

3) Support for post-harvest/processing technologies and regulatory compliance
Technology input is an important theme in PFID and requires addressing critical points in the food chain where awareness, education, and collaborative research may be of value. In this phase, stakeholders assemble to identify critical technological issues and prioritize needs, and LSU AgCenter offers its experience in developing solution strategies, in consultation with local research partners. PFID also promotes technology through its partnerships to support applied research in industry.

4) Capacity building for industry training and collaborative research
Capacity building for industry (private sector) training and collaborative research is the fourth theme in PFID. In short, this theme aims to build a cadre of trained professionals in each of the client countries who can be the leaders to provide training for the industry as well as guide in research programs. This creates local expertise and knowledge, which can provide long-term benefits not only to one client, but to the entire country.

5) Business partnership development
This final theme of business partnerships development consists of two key elements. The first focuses on developing a complete supply-chain, which is typically lacking in PFID countries. The second element focuses on ensuring an efficient supply-chain, which in the case of Nicaragua, certainly does not exist due to infrastructure and incentive challenges.

Program Methodology

PFID is implemented through a five-step implementation process over four years' time. The five steps include the following: 1) industry assessment / crosscutting analysis; 2) assembly of key stakeholders; 3) identification of critical issues; 4) development of solution strategies; and 5) implementation of strategies (LSU AgCenter, 2006a and LSU AgCenter, 2000, 7). Upon conversations with LSU AgCenter about the actual implementation, we have deduced that these five steps may be lumped into two overarching steps: assessment and implementation. In such a two-step system, assessment includes steps 1-4, and implementation (step 5) becomes step 2.

PFID in Nicaragua

PFID in Nicaragua is currently beginning the implementation phase identified in their methodology. From 2004 to present, PFID has been assessing the local situation, building relationships with local partners, identifying the companies with which they will work, and devising strategies to best meet their goals. The program is being facilitated through LSU AgCenter's in-country implementer, CLUSA-Nicaragua[6]. CLUSA has two staff members dedicated to the PFID project.

LSU AgCenter and CLUSA have identified six meat processors as their primary partners and beneficiaries in this program. These six processors are made up of five private processors with

[6] CLUSA-Nicaragua stands for Cooperative League of the United States of America-Nicaragua.

medium to high slaughter capacity, as well as municipal slaughterhouses as a whole for the sixth processor (CLUSA-Nicaragua). All six processors are located in the central area of Nicaragua. Of the private processors, three are located in Managua, one in Juigalpa, and one near Granada. The municipal slaughterhouses are located throughout the country. See Table 1 for details related to these processors.

Table 1: Nicaraguan Beef Processors selected to work with PFID

Processor	Slaughter capacity	Actual slaughter	Employees
San Martín	700 head/day	550 head/day	578
Nuevo CARNIC	400 head/day	320 head/day	365
MACESA	400 head/day	370-380 head/day	300
Nova Terra	200 head/day	32-60 head/day	150
PROINCASA	Unknown	50 head/day	65
Municipal slaughterhouses	Unknown	varies by location	varies by location

(Source: CLUSA-Nicaragua, 2006a)

LSU AgCenter has identified three objectives for the PFID-Nicaragua program, including the following:

1. Food Safety, Quality and Security Compliance,
2. Post-Harvest Technology - Added Value Products, and
3. Plant-Based Training and Technical Assistance (LSU AgCenter, 2006b).[7]

CURRENT CONSTRAINTS FACED BY SMALL PROCESSORS IN NICARAGUA

Small processors in Nicaragua face a variety of constraints in successfully getting their products to market. Such constraints include food safety laws, standards and practices, transportation and infrastructure issues, and management and ownership structure within the meat processing industry.

Food Safety Laws, Standards, and Practices

Decree 158 may stymie meat processing, but it was designed as a food safety mechanism. The Ministry of Agriculture has a team of veterinarians permanently assigned to the five industrial slaughterhouses to ensure animal health and meat safety. By limiting most beef processing to these sites, the law might have guaranteed consumers safe food. However, the prevalence of clandestine slaughterhouses indicates that limiting legal meat processing to these five plants is not an effective solution. Allowing municipal slaughterhouses to process more beef in the

[7] In the authors' opinion, these items describe types of activities, rather than program objectives. Thus, we suggest LSU AgCenter revisit and redefine the objectives such that they may be appropriate for PFID in Nicaragua, based on the program goal and USAID's goals.

presence of inspectors could solve both problems, either by changing the Decree or by privatizing the municipal plants. However, regardless of which strategy is chosen, the Ministry of Agriculture needs to heavily invest in training and hiring more veterinarians and dramatically increasing its inspection budget (Schütz et al., 29). Because municipal slaughterhouses do not currently process enough cows to warrant such investment, it will be hard to justify these expenses.

Moreover, substantial investments will be needed in slaughterhouse technology in order for the present municipal plants to operate successfully under inspection. If Decree 158 is modified to allow publicly-held plants to process more beef, local or national government bodies will have to find these funds. If the plants are privatized, municipalities will have to find private companies willing to make these investments. Rural municipal slaughterhouses serve very limited markets and therefore do not present attractive profit opportunities. Urban municipal slaughterhouses are also unattractive investment opportunities: they do have their own market, but only because they process sub-standard cows and therefore have cheaper products. If they are privatized and begin to process higher-quality meat, they will lose that price advantage, while needing expensive upgrades.

These technological upgrades include two crucial, expensive investments: refrigeration and cleaning chemicals. In 1997, the Ministry of Health prohibited the sale of unrefrigerated meat. However, upgrading slaughterhouses and street markets to enforce this law is impractical; Schütz et al. (5-6) cite an IICA estimate that 42% of meat sold in Managua is unrefrigerated. Indeed, it is rare for municipal slaughterhouses to have either refrigeration or sufficient cleaning chemicals to sterilize the kill floor between animals (Campbell, 6). If municipal plants ever hope to penetrate export markets and take advantage of new opportunities under CAFTA, they will have to not only introduce refrigeration, but freezing. Currently, strong export markets exist for Nicaraguan "industrial cut" beef, which is typically transported between 0° and 10° F. One Chemonics consultant recommends that plants invest in making shelf stable products such as dried beef products, which may be a viable method for remote slaughterhouses to ensure safe transport and legal handling of their products and secure distant markets, but it will not help eradicate the local demand for clandestine slaughtering sites (ibid. 3). Conversely, the same consultant recommends that the use of Electronic Stimulation to tenderize municipal slaughterhouses' sub-standard beef and help eliminate the demand for black-market beef in rural areas, but this strategy will not answer the inspectors' requirements of refrigeration (ibid. 2). Since most plants will not have the funds to invest in both technological upgrades, it will be difficult for them to achieve legal standing and market share growth.

Transportation and Physical Infrastructure Issues

The majority of Nicaraguan cattle are raised in the areas with the least infrastructure (Schütz, 22). Indeed, the Eastern half of the country is almost entirely without paved highways. According to the World Bank, road conditions there have actually deteriorated since the early 1990s, as donor funds after Hurricane Mitch mainly benefited urban centers in Western Nicaragua. In order for small processors to successfully market their products, they will have to face the challenge of transportation. Larger municipal slaughterhouses in Western urban areas may avoid these difficulties, as their roads are in much better condition and they are relatively

close to Pacific ports. The public slaughterhouse in Chinandega may be particularly well-placed for transport, as it is close not only to the Pacific Ocean but to Honduras.

Additionally, many rural municipal slaughterhouses lack the basic physical infrastructure of electricity. The World Bank estimates that half of rural Nicaraguans lack electrical power. It is doubtful that any rural slaughterhouses could be brought up to legal status without heavy investment in this area. Regardless of whether they remain public entitities or are privatized, it will be difficult to find the funds to upgrade all but a few of these plants to legal, fiscally solvent organizations.

Management / Ownership Structure

In order to become financially sound, municipal slaughterhouses will have to completely change their current business model. Lack of competitiveness has caused urban municipal plants to lose market share to industrial and clandestine plants in the last five years. They currently rely mainly on their price advantage to keep their remaining customers (Pomareda et al. 34). Rural slaughterhouses, in contrast, have no history of competition, as there is usually only one per town. Intrinsic organizational cultures will have to be reversed in order to create self-sustaining entities.

Finally, changing the current business model must include increasing market linkage. These plants have never sold to anyone except local vendors, and in doing so, are not financially solvent. If rural plants are upgraded, they may be able to take market share from clandestine slaughterhouses. However, urban plants will lose their crucial price advantage if privatized or allowed to circumvent Decree 158, and vendors will continue to buy from black-market sources unless law enforcement is significantly intensified.

Business Infrastructure Issues

The overall business environment in Nicaragua does not facilitate its presence in export markets and hinders producer effectiveness in the domestic market. Lack of long-lasting, organized markets, vague market entry points, questionable business ethic, and lack of an overall entrepreneurial business vision in the country all pose significant threat to Nicaraguan processors' abilities to get their products to both domestic and international markets (IICA, 4). Moreover, many potential buyers of Nicaraguan products find them to be expensive, largely due to the necessity to work with the informal market and its informal rules, which pose higher risks (IICA, 5).

RESEARCH QUESTIONS

Based on our literature review findings and our client's interest in better understanding how their program and model fit with the local situation in Nicaragua, we have identified the following research questions:

- What can be done to help small processors tap the bigger market in Nicaragua?

- How big is a medium-size processor in Nicaragua? Which processors should PFID target first?
- Are there ways for small and medium-size processors to take advantage of new opportunities presented by CAFTA?
- Are there ways to protect small and medium-size processors from the dangers presented by CAFTA and the larger processors' incursion into the small processors' traditional markets?

RESEARCH METHODOLOGY AND FIELDWORK PLAN

Individual interviews were the primary research method used in our fieldwork. Interviews were conducted with a variety of PFID stakeholders and people who are knowledgeable about the constraints facing small processors in Nicaragua, including the following:

- Industrial processors. We conducted interviews with representatives from four of the five industrial processors with which PFID is working, including San Martín, Nuevo Carnic, MACESA, and Nova Terra. We were unfortunately unable to meet with Proincasa because their management was out of the country during the two weeks that we were in Nicaragua.
- Municipal processors. CLUSA did not have relationships with any municipal processors in the early stages of this paper. However, they were able to arrange meetings with representatives from four of the larger municipal slaughterhouses in Nicaragua, which are located in Chinandega, León, Masaya, and Granada. We were unfortunately not able to secure an appointment with the Managua municipal slaughterhouse, which is the largest in Nicaragua. We gathered information from these sites through interviews and observations, as well as one focus group in Masaya.
- CLUSA staff. As professionals who are the implementers of PFID and other agricultural development programs, we interviewed CLUSA staff because they had considerable information to offer not only about the market situation for meat processors, but also about the process with which they identified the processors in the PFID program in Nicaragua. They were also able to provide information on the program's implementation.
- Government of Nicaragua (GON) staff. We interviewed a CLUSA contact at MAGFOR to provide us with information on current, present, and proposed agricultural policies and how they affect the meat industry's small and large processors.
- CONAGAN – the National Cattlemen's Association. Given its relationships with farmers, as well as small and large meat processors, this group was able to provide us with very interesting overarching and detailed information on the meat processing sector in Nicaragua and the challenges its various constituents face.

We included representatives from organizations and business with varying interests and perspectives in order to get the most well-rounded and representative feedback possible. CLUSA was very helpful in facilitating the sequence of interviews we requested, in which we met with the CLUSA people at the very beginning, to solidify and confirm our background information. Then, we toured and interviewed representatives from the industrial establishments to get a baseline of the best case scenario. Next, we visited the municipal slaughterhouses,

which we knew were much smaller in scale and perhaps had more challenges. Finally, in our last week, we met with CONAGAN and the GON staff to ask questions based on what we had found to that point, as well as to get final, overarching information.

Our analysis of the results of these interviews and focus groups are qualitative in nature, as there are not enough interviewees for formal quantitative, statistical analysis. In order to ensure that we best represented our respondents' opinions, we used a voice recorder whenever possible to document all interviews, with the respondents' approval. We have listened to these interviews repeatedly and have qualitatively analyzed their information in our findings and recommendations section. Our final in-country schedule is located in Appendix A and detailed summaries of the interviews' contents may be found in Appendix B.

FINDINGS AND RECOMMENDATIONS

Our field research resulted in a number of findings that will be of great utility to the PFID program. We have organized these findings into two sections: beneficiary selection and PFID strategies. The first section will identify the small, medium, and large processors in Nicaragua and examine which we believe would be the most appropriate beneficiaries for the PFID program, based on PFID's and USAID's stated objectives and goals. Then, we will address the issues related to challenges facing small processors in Nicaragua and how PFID can address these needs. In this overarching section, we have divided our findings in relation to two different types of obstacles: 1) foreseen obstacles, which we identified before traveling to the field based on our literature research and PFID program documents, and which are described above in the project background, and 2) unforeseen obstacles, which we discovered while in Nicaragua.

Beneficiaries

While in the field, one of our major research questions was to clearly identify the small and medium size processors in Nicaragua. LSU AgCenter asked us specifically to research this issue in order to target ideal beneficiaries. The following is a description of the characteristics of small, medium, and large processors in Nicaragua.

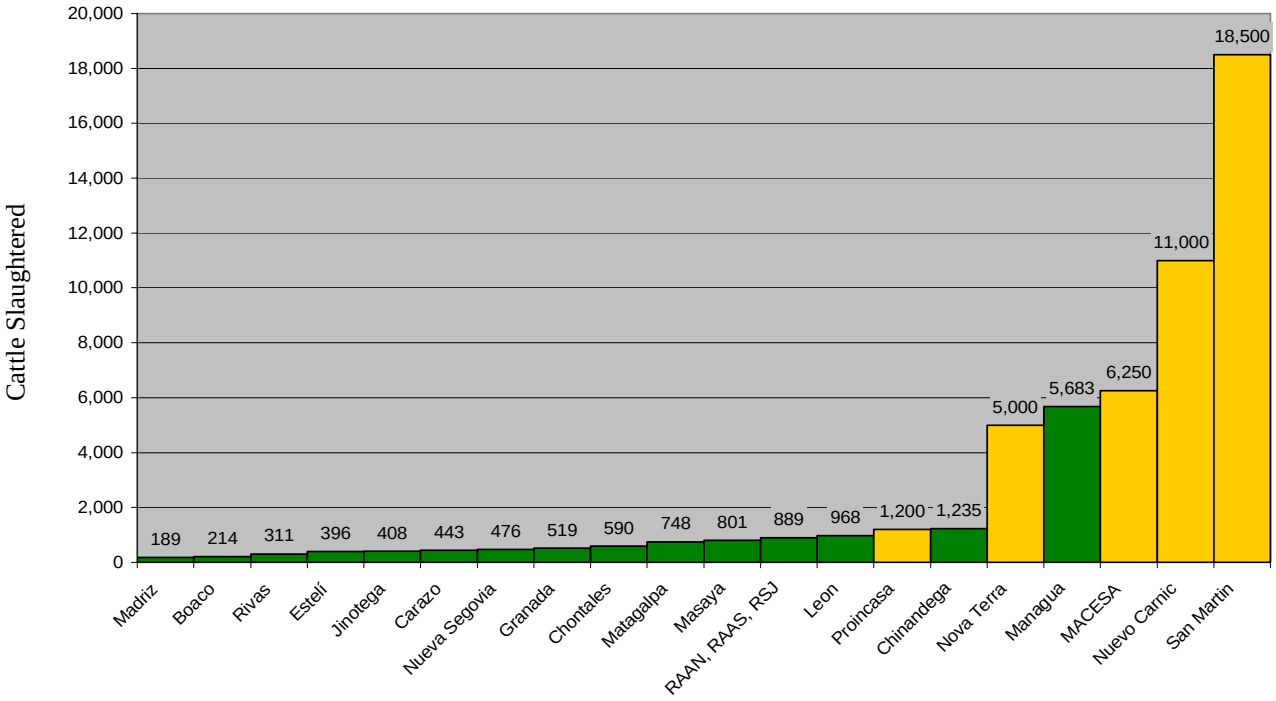
Small processors

After consulting with both private and publicly-held slaughterhouses in Nicaragua, we have concluded that small processors are the artisan processors who use municipal slaughterhouses. Although municipal slaughterhouses themselves are public entities, they never take possession of the animals slaughtered there, nor do public employees actually slaughter the animals. Rather, private, artisan processors who own sole proprietorships of sorts with a small staff (3-4 employees each) process their animals at the municipal facilities. The municipality charges a nominal fee for the use of its space to slaughter the animals, not for the slaughter services. Thus, municipal slaughterhouses actually serve as a venue in which processors that are too small to have their own processing plant can legally slaughter their animals, rather than turning to clandestine operations.

The municipal slaughterhouses do not merely provide a public service to the private, artisan processors who slaughter animals there. Rather, they also provide a means to verify the cattle's legal ownership for processors and vendors. All processors, small and large, identified a significant problem related to cattle theft in Nicaragua. Large, industrial slaughterhouses have MAGFOR inspectors on-site to verify the health and legal status of the cattle that are processed there. Thus, the municipal slaughterhouses offer a similar process for the small businesspeople who process their cattle there: the municipality uses the slaughter fees that are charged to its users to pay for municipal and MAGFOR certified staff to inspect the animals.

Our fieldwork included site visits and meetings with the employees of four municipal slaughterhouses: Granada, León, Chinandega, and Masaya. In Masaya, we also had the privilege of speaking with a group of artisan processors who slaughter their animals at that facility. There was no cold chain technology or temperature control at any of these four facilities. Slaughters were carried out at night in these venues for two reasons. First, the natural temperature at night is cooler, thus slowing the impact that the intense Nicaraguan heat has on the meat's deterioration. Second, slaughters are done at night so the local vendors can take their meat to the artisan markets very early in the morning, which is typically when people purchase fresh meat.

Figure 4: Monthly Meat Processing Production



Sources: San Martín, Nuevo Carnic, MACESA, Nova Terra: personal interviews (2006). PROINCASA: Comisión Centroamericana de Ambiente y Desarrollo (2002). Others: Schütz, et al. (2004).

Municipal slaughterhouses that we visited reported having between 6 and 18 artisan vendors that regularly process cattle at their facilities. These artisan vendors reportedly slaughter up to 10 cattle per day, although that figure is often lower. Despite the high number of processors

slaughtering cattle at municipal facilities, their volume is still miniscule in comparison with the large, industrial processors (see Figure 4).

The small, artisan processors are currently not identified beneficiaries of the PFID program. However, those that we interviewed are eager to improve their practices and would welcome assistance and training from the PFID program. They fully recognize the importance of incorporating technology into their slaughter processes and are willing to invest, if given the necessary expertise and access to credit in order to do so. They noted that as small processors, they have almost no access to credit, which is keeping them from improving their business function, food safety, and inevitably, their market potential. Thus, it would be strategic for CLUSA to identify a reputable local credit program that these small processors may use to improve their capital structures, in conjunction with the PFID program to address their human capacity obstacles. PFID has the ability to train these small processors on the technological issues that currently limit their markets and food safety. Moreover, the artisan processors from Masaya did expressly state that they are interested in working together as a group to invest, borrow, and do business in order to create better economies of scale and be more competitive with the large, industrial meat processing facilities.

Entering our research, we were concerned that the municipal slaughterhouses may not be appropriate beneficiaries because they are publicly held. PFID clearly aims to assist small and medium businesses (not public enterprises); thus we faced a potential mismatch. However, once in the field, we realized that the municipal slaughterhouses are actually sustainable cost centers that do not rely on the municipality for funding; rather, in all four municipal slaughterhouses we visit, they generate more income than they expend or they break even, which is unusual for a public entity. In short, they actually provide income to the municipality. More importantly, since the municipal slaughterhouses serve as a venue for artisan processors to slaughter and process their cattle, their clients are actually the prime PFID beneficiaries. The municipal slaughterhouses themselves would need to be involved for capital improvements to improve food safety. However, all municipal slaughterhouse staff was very interested in creating a more business-conducive environment for their processors and the processors expressed interest in investing in the current facilities themselves. Thus, *a prima facie*, it appeared that the municipal processors would not be potential PFID beneficiaries, yet once we dug deeper into their operations, we found that they in fact should arguably be the focus of PFID's efforts.

Recommendation

The artisan processors at municipal slaughterhouses are the exact type of small processor that the PFID and USAID goals targets. As small, private businesspeople, the artisan processors rely on their profits to survive. Those that we interviewed were concerned about being able to survive with the growth of the large, industrial processors, given the small processors' challenges of economies of scale and technology. There is no need to either privatize the public facilities or extract greater performance from public employees in order for PFID to be relevant to the needs of small processors.

However, recognizing that some municipal slaughterhouses are more progressive and ready for the PFID program than others, we feel that PFID staff should do a tour of the country's 10 largest municipal slaughterhouses to identify the venues where both the municipal

slaughterhouse management and the artisan processors have the potential to benefit from the PFID program. From the four sites we saw, we feel Granada, Chinandega, and Masaya would likely be appropriate candidates for the PFID program. The staff we spoke with at all three sites was very forward-thinking and showed desire to improve their facilities and processes to improve markets for their artisan processors. The one site that we feel is too underdeveloped for the program is León. They lacked even the basic sanitation that the other facilities had, and they admittedly ran a haphazard ship. The manager had worked in good faith to improve food safety and other processes, but was obviously disenchanted and had a lot of work left to do before their site would be a possible PFID beneficiary.

Medium processors

Our research prior to traveling to Nicaragua led us to believe there were very few, if any, medium-size processors in Nicaragua, and our in-country findings confirmed this speculation. Nicaragua has a dichotomous meat processing sector, in which there are a vast number of small, artisan processors, and a handful of large, industrial processors. The small processors use the municipal slaughterhouses to process their meat, while the large processors have their own private facilities to slaughter cattle.

This dichotomy is visible in the production values in Figure 4. This chart also indicates what we believe is the only medium-size processor: Proincasa, the only Nicaraguan industrial processor that produces solely for the domestic market. The larger municipal slaughterhouses have production statistics similar to that of Proincasa, so at first glance it seems they, too, would be medium-size. However, since each municipal statistic in this table includes all municipal slaughterhouses in that department, and within each slaughterhouses there are 5-20 artisan processors who regularly process beef there, it is apparent that while production at these publicly-held facilities is greater than in other departments, that it is still nowhere near the production capacity per processor that the industrial facilities boast.

Recommendation

Currently, Proincasa is a designated beneficiary of the PFID program. We believe they are an excellent candidate because even though they are large from the perspective of the artisan processors, they are still lack the size and quality certifications of the large industrial slaughterhouses that target the export market.

Unfortunately, we were not able to meet with and tour Proincasa, as their management was out of the country for the entire time we were in Nicaragua. However, we have read extensively about Proincasa, and we have noted that Dr. Ken McMillin's January 2006 assessment for the LSU AgCenter detailed Proincasa's operations and appropriateness as a beneficiary (McMillin 5-6).

Large processors

The large processors in Nicaragua include all of the industrial processors except for Proincasa. Specifically, these four processors are San Martín, Nuevo Carnic, MACESA, and Nova Terra. Based on the production figures reported in Figure 4, it is clear that these four processors are the giants of the Nicaraguan meat industry. Their average monthly production for one facility is roughly double that of all of the municipal slaughterhouses in the Municipality of Managua

combined (5,683 and 10,187, respectively). The disparity is even greater when one looks at the average large-processor output (10,187 cattle/month) compared with the average municipal output (925 cattle/month) – more than 11 times higher production.

This disparity will likely continue to increase. Nova Terra's capacity is only slightly lower than that of MACESA, even though Nova Terra has been in business for just three months. Also, despite their recent establishment, Nova Terra staff indicated an interest in expanding their capacity over the next several years to further increase production and economies of scale. MACESA staff indicated intensions to expand production capacity this year, and Nuevo Carnic is currently in the process of expansion.

The four large industrial processors we interviewed and visited all had state-of-the-art facilities. All had a designated HACCP department and boasted all international food safety certifications. The industrial plants are all certified for export to the other countries in Central America, Mexico, the United States, Puerto Rico, Taiwan, and Japan.[8] San Martín is currently making adjustments so it can meet the European Union's food safety standards, which are even more stringent than those of the United States.

When asked of their most serious challenges, not one of the industrial processors identified food safety or technology as a challenge. Rather, they noted that maintaining these standards is a cornerstone of their export-focused business and they do so diligently. Interestingly, all four large processors identified decreasing cattle stocks as their biggest constraint. This constraint is a challenge directly facing the cattle producers, not processors. However, this problem has ripple effects that directly affect all of the processors, both small and large, that we interviewed. Large, industrial processors were adamant in their insistence that something must be done to retain cattle stocks in Nicaragua and improve the local business climate and living standards for farmers.

Recommendation

The four large industrial slaughterhouses are all currently identified as PFID beneficiaries. However, upon speaking with them at length, it became apparent that they are not in need of such a program because they do not face quality-based barriers to market entry and their technology is currently equivalent to that in the United States. Moreover, it is clear that they are not the small to medium-size processors that PFID targets. Thus, we recommend that LSU AgCenter reconsider the inclusion of these processors as their primary program beneficiaries.

While we do not feel these four industrial slaughterhouses are appropriate target beneficiaries, we do believe they can and should have a definite role in the PFID program. Their staff knowledge can be used to train small processors in Nicaragua on good food safety practices. We were impressed by the sincerity of their concerns related to small farmers and processors. Although their concerns were undoubtedly in part due to their business interests, they also obviously reflected the individuals' desire to improve living standards for farmers.

[8] Although Puerto Rico is part of the United States, all processors made a distinction between the two markets, as the cuts of meat sold in Puerto Rico are different than those sold and marketed in the United States.

Foreseen Obstacles to Small Processors

Working with Nicaragua's small processors will not be easy. These processors face myriad challenges in reaching their market and even keeping their current market. Our team foresaw some of these problems. For these areas, the discussion below gives the specific cases we encountered and our recommendations. Other, less obvious obstacles are discussed afterward, in greater detail.

As discussed above under "current constraints," our team anticipated several problems currently facing small meat processors in Nicaragua. Most important is that of food safety standards and practices. As our interviews confirmed, standards are not consistently enforced, so practices leave much to be desired. Four major impediments to improvement in this sector arose from our fieldwork: government inspections, plant infrastructure, personnel training, and public (municipal) financing and infrastructure.

Food Safety Standards and Practices: Inspections

CLUSA's reluctance to date to work with municipal slaughterhouses may be related to the way Nicaraguan food safety standards are enforced. CLUSA's capacity-building program is built around the goal of conveying MAGFOR standards to processors.[9] However, MAGFOR's Bernabela Orozco explained to us that MAGFOR has no dealings whatsoever with municipal slaughterhouses. She presented the Ministry's mission as benefiting food safety in both the domestic and external markets, but she later noted that MAGFOR only furnishes inspectors for those slaughterhouses that export – a striking dichotomy. MAGFOR services thus exclude both municipal slaughterhouses and Proincasa, which serves the domestic market. CLUSA's Carlos Sánchez explained that this is because "all of the current food safety laws were created at the behest of the international market."

Moreover, there are dramatic financial obstacles to MAGFOR's access to small and medium-sized slaughterhouses. Slaughterhouses must pay the full salaries of the MAGFOR inspectors working at their locations, as MAGFOR does not have the necessary resources. (Sánchez saw no inherent conflict of interest in this arrangement, as allowing violations to continue could cost a plant their export market and cause them to shut down altogether.) These salaries represent a significant investment in multiple staff. For example, Nova Terra supports a staff of five to six full-time MAGFOR inspectors. Their current production is approximately 60 head per day, so their staff includes roughly one MAGFOR inspector for every 10 cows. If Proincasa or even the larger of the municipal facilities were to provide this level of inspection service, they would have to furnish several inspectors.

Small and medium-sized slaughterhouse owners have not had the incentive to pay for this inspection service, because unlike their larger counterparts, they do not receive USDA inspections and thus do not face a market loss for their unsanitary conditions. In the case of municipal slaughterhouses, city governments have avoided providing artisan processors with facilities that meet minimum Nicaraguan legal standards, by simply not paying for inspection. Moreover, artisan processors have no option but to use these substandard facilities to have legal

[9] Although several Ministries are involved in setting food safety standards, all enforcement is in the hands of MAGFOR.

access to markets. Since it is illegal to sell warm meat, if MAGFOR were to inspect municipal facilities, it would most likely require them to provide refrigeration for the artisan processors. However, without the presence of inspectors, processors have no recourse against the unsanitary conditions at the slaughterhouses they legally must use. Though many who spoke with us expressed a desire to expand their markets, there is no way for them to meet legal requirements without municipal support.

Small and medium-sized slaughterhouses do undergo occasional MINSA inspections. However, Orozco indicated that MINSA has a very low capacity due to both budgetary and personnel problems. She explained that MINSA coverage varied widely between plants, and concluded that artisan processors must rely on the good will and generosity of their towns to ensure healthy work facilities. Our interviews strongly corroborated this statement. CLUSA estimated that MINSA inspected municipal slaughterhouses roughly three times per year, but public slaughterhouse staff and their processors expressed a wide range of experiences. Granada's Jimmy Villareal could recall only three to four MINSA visits during his tenure, though he has been at the facility for years. León's Leonel Acuña complained that although he understood that MINSA inspectors were to come twice per week, he had never seen them during the two weeks he had worked there. Pedro Salinas, in Chinandega, receives inspectors very regularly – every two weeks. The most frequent visits appear to be at the Masaya plant, where they come weekly.

Finally, although municipal slaughterhouses are not subject to MAGFOR inspection, they do receive animal health oversight by MAGFOR-certified veterinarians, who perform pre- and post-mortem inspections on each slaughtered animal. In the case of public slaughterhouses, the quality of care and oversight the processors received varied greatly by location. In Masaya, the veterinarian has many years of service and is well-respected by the processors. Processors claim that disputes between him and their staff are extremely rare, as no one doubts his familiarity with the law. He has also won their respect for his dedication to his grueling schedule: he works all afternoon inspecting the animals as they arrive, and then returns for the night shift, to inspect each carcass as it is processed. Chinandega enjoys the services of *two* veterinarians (one for pigs and one for cows), and MAGFOR staff come in person to resolve any disputes between processors and veterinarians. In León, by contrast, Mr. Acuña indicated that the veterinarian had never once arrived to perform the required pre-mortem inspections, and only arrives once per shift to take a quick glance at the processed meat and sign the necessary paperwork. By and large, there is little accountability for this position; the veterinarians work directly for the city and do not answer to slaughterhouse staff. Only MAGFOR and the city governments can demand better performance, which our interviews indicate is rare indeed. Thus, the quality of the inspection by MAGFOR-certified veterinarians essentially lies in the work ethic and integrity of the veterinarian himself.

A stark example of the results of irregular inspection arose at León. Among other glaring violations, our team noticed that cows and pigs are slaughtered in the same room; this practice represents serious cross-contamination risks. Moreover, the city has not provided tables for cutting meat, so the entire slaughtering and cutting process occurs while the carcasses are on the floor, which is never thoroughly cleaned – only rinsed daily. Finally, though it is illegal to slaughter pregnant cows, Mr. Acuña said that this occurs quite frequently, to the extent that there is often a pile of calf fetuses in the corner of the slaughterhouse after the nightly slaughter. Less

than a week before our visit, Mr. Acuña said that a cow actually gave birth while waiting to be slaughtered. Enforcement of this law is the responsibility of the site's MAGFOR-certified veterinarian, whose inattention leads to what Mr. Acuña described as "totally indiscriminate" slaughter practices. If the León slaughterhouse underwent the MAGFOR inspections that the industrial slaughterhouses receive, the municipality would be required drastically improve the conditions small processors endure, and ensure that they are slaughtering legally.

Recommendations

Not surprisingly, the disparity in the condition of these facilities is directly correlated with the frequency of inspection. Those that were best-equipped and cleanest reported receiving inspectors more frequently. As PFID begins work with small processors in the municipal facilities, ensuring regular inspection of small and medium-sized slaughterhouses will be key. If cities refuse to make the necessary upgrades to the facilities, PFID's training will have limited impact. Fortunately, now is an ideal time for PFID to explore with MAGFOR options for expanding inspections, as MAGFOR is currently working with the Inter-American Development Bank on a modernization project, set to include funding for technical employees. Ensuring greater frequency of MINSA inspections is less of a priority because MAGFOR inspections are much more detailed and cover every aspect of the slaughtering process. MINSA, in contrast, merely certifies that the facility meets health code standards. It is doubtful that a slaughterhouse could pass MAGFOR inspections yet fail those of MINSA, so securing proper MAGFOR oversight will make a substantial improvement. PFID has aimed to work with government stakeholders as well as private stakeholders in other countries; thus, we recommend that these aims be met by direct negotiations with MAGFOR offices in Managua and local governments where PFID will be working.

Food Safety Standards and Practices: Plant Infrastructure

Differences among slaughterhouses in technology and infrastructure are as stark as inspection rates. None of the facilities we visited offered refrigeration for local processors, and none of the staff were satisfied with their plants' current state. However, plants still exhibited a wide variety of conditions, mainly owing to the available finances.

Again, León offers an example of the worst physical infrastructure conditions we encountered. Mr. Acuña had been appointed to his position by the mayor just two weeks before we interviewed him. Shock and despair were evident in his voice has he explained to us, "Here, we have absolutely nothing. Here, we work only by the will of God. I told the mayor that he may as well have sent me to Baghdad." He also noted that he himself would not eat meat processed at that facility. Masaya, however, had separate, clean facilities for slaughtering cows and pigs, stainless steel tables on which to cut meat, and a suspension system to hang carcasses for better draining, skinning, and cutting, although it was in need of repair. Chinandega had budgeted for the installation of such a suspension system this year.

Another disparity we found among slaughterhouses was the treatment of waste. Although this does not represent a direct obstacle to market, it does make a significant difference in the financial efficiency of the facility and its impact on the environment, which has direct implications on public health. In Chinandega, for example, processors' fees were no longer being used to pay for firewood to boil water because a methane bio-digester turned waste into

gas for burning. This technology is both more environmentally and more financially efficient. The manager, Pedro Salinas, has been able to redirect the money previously spent on wood for other projects, including a radio outreach program that has taught consumers how to avoid clandestinely-slaughtered meat, which has surely helped their market.

These differences are based in the towns' use of their slaughterhouse user fees. Therefore, small processors can do little or nothing to improve the quality of their products or their ability to access larger markets. If processors had access to credit, they could begin to invest in basic cold chain technology for their individual products, regardless of the plant's level of technology. For example, Chinandega's Pedro Salinas knows of Salvadoran processors who use the Managua municipal slaughterhouse, but have invested in their own refrigeration technology so they can legally transport the meat back to El Salvador. However, small processors in Nicaragua have no such access to credit. While speaking to CONAGAN, we heard from both Mr. Lovo and Mr. Blandón that it is widely understood to be easier to finance the purchase of a car for personal use than technology for business use, even though the latter is usually more expensive and impossible to obtain without credit. Therefore, small processors rely on the public facilities they use to provide the legally mandated safety equipment.

Where slaughterhouse staff has been able to make investments in plant technology, it has significantly improved efficiency, sanitation, and thus, access to market. Such upgrades are indeed possible. In speaking with facility managers at plants in Chinandega, Masaya, and Granada, we learned that all three have plans and budgets already in place for this year's improvements, and have slated further projects for the coming years. As will be discussed below, these projects are possible wherever slaughterhouses can keep most of their income, rather than pass it on to the city government. Moreover, Chinandega has funded most of its large-scale capital improvements by grants secured through a local government office dedicated to working with and identifying funding from foreign donors. Currently, the staff and processors are waiting to hear the decision of a group of Dutch donors who may fund the facility's first refrigeration system.

Recommendations

The larger of the public slaughterhouses have shown that they are capable of finding funds for the necessary improvements to reach MAGFOR standards. What they lack is the know-how to choose the best technology and maintain it. For example, when Carlos Martínez first arrived as the manager of the Masaya slaughterhouse, he found that the previous manager had allowed their bio-digester to fall into disrepair. Parts of that system lay strewn across the property. While we were touring the facility, he proudly displayed a large piece he had found and was planning to turn into a feeding trough for corralled animals. What he did not know was that this piece was the filter used to separate solid and liquid waste in the bio-digester system, as we had learned while touring Chinandega's working system the previous day. Such a piece would make an extremely unsanitary feeding trough and destroy a crucial piece to the bio-digester, which could likely be fixed. Mr. Martínez was eager to improve his facility through any means possible, but he lacks the familiarity with technology to make wise decisions. Staff at the Chinandega, Masaya, and Granada facilities all expressed a desire to learn more about possible technology improvements, and how they can seek funding from donors for capital investments. This type of education is precisely the mission of PFID. Specifically, it is the authors' opinion that

incorporating these needs into the Train-the-Trainer program would prove both feasible and highly effective in working toward the program's and USAID's stated goals.

Food Safety Standards and Practices: Personnel Training

Small processors may never reach the level of training found at industrial slaughterhouses. Nuevo Carnic currently employs one quality control employee for every cow slaughtered daily, which is clearly an impossible feat for a public facility. However, some slaughterhouses have made significant strides in this direction. Their experience shows that it is both possible and valuable to involve small processors in food safety training.

Three of the four slaughterhouses we visited offer some training to the artisan processors that use their facilities. Artisan processors in Granada receive training workshops at least once per year. As most of the processors have been working there for over a decade, Mr. Villareal was very confident in their current skill. Mr. Martínez, manager of the Masaya facility, takes a less direct approach, but he frequently sends memos to processors to help them teach their own staff and provide guidance. These memos describe safe carcass handing and outline recommended training. Finally, León and Chinandega offer interesting examples. Even though the León processors receive no training whatsoever, faculty at the *Universidad Nacional Autónoma de Nicaragua – León* give training to processors in Chinandega on meat handling, animal health, and basic sanitation. This dichotomy illustrates the importance of connecting public-sector university staff and private-sector processors. Although the university faculty work in close proximity to the León slaughterhouse, they offer training in Chinandega, where they have contacts.

Recommendations

In our first interview, CLUSA staff expressed that they "offer producers options, but the initiative must come from the producers themselves." However, in this case, processors and slaughterhouse managers may need to be told of the opportunities available to them through PFID. For example, Pedro Salinas, manager of the Chinandega slaughterhouse, said that he would like to partner with an industrial slaughterhouse for training purposes, but he does not have the necessary contacts to initiate such a project. Informing them of the options around them and connecting them to local experts will not be prohibitively difficult for CLUSA. Indeed, the Train-the-Trainer program currently under development as part of PFID will be an ideal format for this dissemination. Its focus on creating a network of experts throughout the country perfectly matches the needs of processors in towns such as Chinandega, which are several hours away from the locations of industrial slaughterhouses.

Food Safety Standards and Practices: Public Infrastructure and Finance

Public infrastructure projects, such as highways and electricity, play an obvious role in processors' ability to get their products to market. However, they also represent direct competition for much-needed funds in the municipal budgets. PFID's emphasis on bringing various stakeholders together from different sectors could offer significant help in this area.

The amount of support, money, and training municipal slaughterhouses have depends on their relationship with the local government. This is not to say that the facilities rely on government handouts. To the contrary, their budgets depend on how much of their income from user fees is

siphoned off for other city projects. Once again, León provides the most desperate situation. Its annual budget is 100,000 córdobas (about US$5,800), even though its user fees for cows alone generate at least nine times that amount. The City of León uses the remaining money for other public infrastructure projects, for which it receives no federal assistance, as the party in power locally has no national power. Mr. Acuña foresees this problem growing worse, as many local roads washed out during last year's rainy season and must be repaired, presumably with funds that the slaughterhouse generates.

Masaya represents the opposite end of the spectrum. Its slaughterhouse is completely financially independent from the city; its 2006 budget, of over 1,500,000 córdobas (about US$86,957), comes directly from user fees. It also augments that budget through the sale of fruit grown on its property, including avocados, mangos, and bananas. During our interview, processors suggested that one solution to their food safety obstacles might be to form a user's cooperative and act with the attitude of owning the facility, as they already fund every aspect of its operations. Granada and Chinandega have situations that fall between those of León and Masaya, in that they are allowed to keep enough of their income to finance all of their needs, but they are reliant on the municipality to make the funds available upon request. Interestingly, the City of Granada is currently considering a proposal to privatize the slaughterhouse there. This proposal is part of a larger revitalization plan including a Mexican company's purchase of the landfill. The Mexican company is growing anxious for an answer, so Mr. Villareal, the plant's *fiel de rastro*, believes a decision will most likely be made this year. When asked for his personal opinion of the plan, Mr. Villareal stated that he looks forward to the change, because of the independence it will allow him in budgeting. Even though he keeps his plant's budget, he cannot always be sure that their account actually has the money it should, because the city is free to take money from the account for other civic projects and replace it later.

Even outside of the realm of their effect on slaughterhouse budgets, public infrastructure needs represent massive obstacles to market. CONAGAN calculates that it is more expensive for U.S. customers to import beef from Nicaragua than from Australia, despite the former's relative proximity, due to the poor condition of Nicaragua's roads. Moreover, they stated that slaughterhouses often must discard up to 15% of the usable meat from cows due to injuries sustained during transit from the farms to the processors on sub-standard roads. For example, MACESA's Nicolle Auffret stated their plant's location, two hours east of Managua, provides them with an important comparative advantage Because the plant is closer to the farms, cattle arrive at MACESA with far fewer transit injuries. Finally, poor roads can completely sever the producer-processor links. Nova Terra's Erick Matus complained that washed out roads cut off some suppliers for the entire rainy season, which is the very time the cows are prime for slaughter.

Recommendations

PFID's work could greatly benefit from improvements in Nicaragua's highway system, even though the current conditions do not completely block their efforts. Such projects clearly fall well outside of the scope of PFID. For this reason, our team recommends that they be considered by PFID's funder, USAID, or another equivalent donor, for future complimentary work.

Management Obstacles

Before our team toured the municipal slaughterhouses, our research had indicated that slaughterhouse staff performed the meat processing functions. We anticipated difficulty in demanding higher standards of food safety from these public employees, as they see no financial gain from their extra work. However, we quickly discovered that the processors were actually small businesspeople and their staff, with clear motives to improve quality and productivity.

Nonetheless, concerns still arose from the precarious situation in which Nicaragua's artisan meat processors find themselves. Though they are private businesspeople, artisan processors must rely on their local slaughterhouse staff, who are public-sector appointees, to provide a safe working environment. As we toured these slaughterhouses we were suspicious that it might be difficult to expect improvements from these public appointees for the reasons listed above. However, we were pleasantly surprised. All slaughterhouse managers we interviewed were clearly, keenly aware that their income comes from the processors' fees, and their budgets depend on the processors' success.

This understanding motivates the public-sector managers to continually seek ways to improve their facilities, and thus their client's profitability. For example, Pedro Salinas, manager of the Chinandega slaughterhouse, is quite proud of the progress he has made in eliminating Chinandega's clandestine cattle slaughtering operations. He attributes this success to his radio-based public outreach campaign, which has educated consumers of the importance of choosing meat from government-inspected slaughterhouses. While serving public health, this program has also ensured market access for legal artisan processors, and raised revenues for both them and the slaughterhouse, through their fees. To augment this program's effectiveness, processors at the facility stamp each cut of meat to identify its origin and assure consumers that it was legally and safely processed.

Similarly, Masaya's Carlos Martínez has begun a project of increasing the number of pig corrals. Originally, each processor was assigned one corral wherein to leave animals during the day. This system made it easier for the processor's staff to quickly identify their employer's animals that night when they arrived for the night shift. However, the number of processors has increased beyond the number of corrals. Currently, one larger corral is used as an overflow area, holding several processors' animals. While the inconvenience created by this is arguably minor, merely requiring processors to mark their animals, it has the potential to lead to disputes. Thus, construction of a second set of corrals has begun and should be completed soon. As part of this improvement, Martínez plans to install an unloading ramp to avoid injuries to pigs that currently are pushed out of trucks in the unloading process. These improvements will lead to greater productivity, higher quality products, and ultimately, greater revenue for the facility.

Recommendation

In the authors' opinion, slaughterhouse managers' motivation for improvement poses no obstacle to market for small processors. Slaughterhouse managers have made creative use of their budgets as they seek new ways to improve productivity and revenues. This progress could be encouraged by establishing a network of communications among these managers. For example, according to the Carlos Martínez, in Masaya, artisan processors in Managua struggle to compete with cheaper, clandestine processors. They could benefit from adopting a consumer outreach

program akin to the one implemented in Chinandega. CLUSA staff expressed doubt that Nicaraguan meat processors would be willing to share their practices with each other, due to competitive pride. However, smaller processors do not so much compete against each other as they do against clandestine and industrial processors, whose products are increasingly ubiquitous. We suggest that CLUSA work to facilitate open forums for small processors to learn new leadership techniques and ideas from each other, as well as from the experts developed through the Train-the-Trainer program.

Legal Obstacles

Nicaraguan Decree 158 dictates which type of cows can be slaughtered, and at which type of facility. Specifically, it only allows artisan processors to slaughter cows considered to be substandard because of their age, weight, or a deformity. However, all of the processors we interviewed, whether industrial or artisan, were unanimous in their assessment of current enforcement: non-existent. In fact, MACESA's Nicolle Auffret did not even know of this law. Moreover, according to Chinandega's Pedro Salinas, Salvadoran processors export meat processed at the Managua public slaughterhouse, which is also expressly prohibited by Decree 158. Nevertheless, if PFID is to address the needs of small processors, it must avoid breaking the law to do so.

Recommendation

Law 158 was enacted as a presidential decree in January 1986, a time of civil war and political instability one year before the creation of the current constitution. The law was enacted to serve a dual purpose: to stem the tide of farmers slaughtering entire herds due to wartime poverty and land invasions, and to ensure public health during a time that Nuevo Carnic's Manuel Centeno described as tumultuous, with slaughterhouses changing hands frequently and sloppy government oversight. Government inspection of slaughterhouses has improved greatly in the last 20 years, and will improve more if PFID negotiates expanded inspections with MAGFOR through the current IDB project. In short, this presidential decree was enacted to address a situation that no longer exists. We recommend that PFID address this problematic law through its planned Food Safety and Quality Organization, which is to be formed between July and October of this year, and whose mission includes policy formation and intervention.

Unforeseen Obstacles

The aforementioned obstacles were apparent from our literary research prior to traveling to Nicaragua. Our team's principal reasons for traveling to the field for in-person interviews were to seek answers for the previously identified obstacles, as well as to identify other obstacles that are not apparent from current literature. Our in-country research identified three such unforeseen obstacles to small and medium-size processors in Nicaragua. These obstacles include competition from industrial processors, cultural barriers, and diminishing cattle stocks. Each of these obstacles is discussed in detail below.

Competition for artisan processors from industrial processors

In recent years, greater export markets have allowed large, industrial processors to expand their capacity and take advantage of economies of scale. Figure 5 shows the dramatic increase in beef exports in just the last three years. This trend is largely due to Nicaragua's comparative

advantage over countries with BE ("mad cow disease") and foot-and-mouth disease, both of which have greatly concerned consumers recently. As a result of greater production, industrial slaughterhouses have benefited tremendously from economies of scale. Now, corporate-processed beef is cheaper than artisan-processed beef. Corporate slaughterhouses have used their economies of scale to expand into domestic markets where they previously had no presence. They have bought retail stores and tapped distributors to penetrate domestic markets outside of Managua.

Members of the Masaya focus group felt that such competition from industrial processors was one of the most difficult obstacles that local artisan beef processors face. They stated that Proincasa sells in Masayan supermarkets at half the price of local processors. As a result, artisan meat processors reported that their production and sales have been cut in half since Proincasa's arrival to the Masaya market. The interviewees estimated that Proincasa currently has 40% of the Masaya market for beef, and they believe that share will only continue growing. San Martín has also recently entered the Masaya market through direct delivery to housewives.

The Masaya focus group members noted that there is a local law banning the transport of warm meat from one department to another. This law further exacerbates the competitive advantage for industrial slaughterhouses, since the municipal slaughterhouses and the small, artisan processors who slaughter there have no cold chain technology and thus do not have access to the large domestic distribution network of the more technologically advanced, industrial processors. In short, industrial plants can sell their product in the artisan processors' traditional markets, but not vice versa.

Moreover, artisan processors claim that the government is closely tied to the large, industrial processors and thus unjustly favors them in their policies. For instance, the Masaya processors claim that Proincasa is selling its product below cost in local markets. To address this, the artisan processors met with the municipal government and asked for help. However, they are not optimistic that anything will come of their meeting because as artisan processor Maritza Añamendi stated, "The government turns a deaf ear to us, but there is no limit to what they will do for the big companies."

Recommendation
If donor funding or improved access to credit allows for the installation of freezers or other cold-chain technology, and if PFID provides training to facilitate the proper use of such equipment, this disadvantage to small processors will be lessened. Restricted access to credit is a major cause of lack of investment in cold chain infrastructure by the artisan processors. While credit programs are not in PFID's mission, it would certainly be complementary to look for another NGO or donor program working with credit to form a coalition. The marriage of PFID with such a program would result in an overarching program linking technology and access to credit in order to improve the overall climate for the small, artisan processors.

Also, several artisan processors indicated strong interest in organizing cooperatives for the sake of joint cattle purchasing and joint sales. They believe that by working together, they will be able to share more costs and gain better economies of scale to more effectively compete with the industrial processors. If this were to occur, artisan production costs could significantly drop due

to shared fixed costs. Facilitating such a step is outside the scope of PFID, but falls squarely within the mission and history of CLUSA. Thus, our team believes it is highly recommendable as a future CLUSA project, directly contributing to an overarching program to improve food safety and livelihoods of small processors.

Cultural barriers

In our initial meeting with CLUSA in Nicaragua, Tania Casaya identified cultural barriers as a major obstacle that will keep local consumers from purchasing frozen or chilled, safe meat. Specifically, she stated that housewives need to be educated about the proper handling and preparation of cold and frozen meat in order to increase demand. As present, she said that consumers are not familiar with the safe, frozen/chilled products, and thus they demand warm meat (i.e. meat processed with no cold chain). We had not foreseen such an obstacle prior to traveling to Nicaragua, but we were very interested in her impressions and addressed them in interviews with other stakeholders throughout the in-country study.

During our meetings with industrial and artisan processors, the perceived obstacle of cultural barriers did not seem to be an issue. Rather, both industrial and artisan processors reported an increase in consumption of chilled or frozen meat product in the Nicaraguan domestic market and a trend for housewives to prefer chilled or frozen cuts. Obviously, industrial processors were joyous, because this indicates market growth for them. In contrast, as narrated in the previous section, artisan processors showed concern, as it decreases their market. Both types of processors stated that previous preference for warm meat in the Nicaraguan domestic market was due largely to the disparity in cost between the artisan (cheaper) and industrial (more expensive) meat. However, since industrial facilities have improved production efficiency and gained better economies of scale, there has been a definite swing in preference to the safer, industrial cuts, which are now actually cheaper than the artisan cuts.

Recommendation

While the issue of cultural barriers to safe meat may have been an obstacle at one point in Nicaragua, the responses from both artisan and industrial processors indicated that this is no longer the case. The emergence of safer meat at a lower price has actually created a cultural preference for industrial cuts.

Diminishing stocks

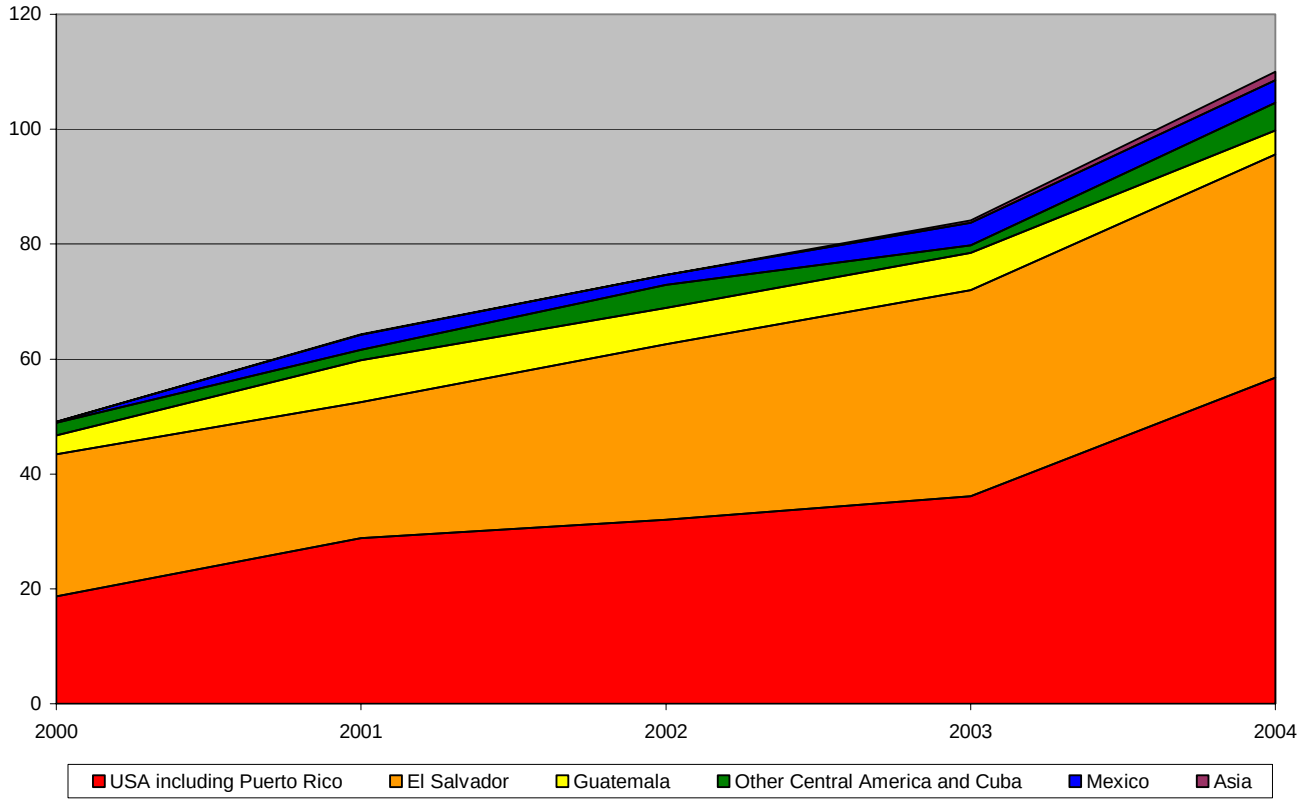
The final and perhaps most daunting unforeseen obstacle is diminishing cattle stocks. All meat processors we interviewed identified this as a challenge that is out of their hands but has the potential to harm their industry, and has had serious ramifications to date. Diminishing stocks are a direct result of cattle over harvesting and may be attributed to two reasons: 1) export of live cattle and 2) slaughter of young and pregnant cows.

Export of live cattle. The export of live cattle, especially to Mexico and El Salvador, is draining Nicaragua of its stocks without value added, bringing with it major economic ramifications. Mr. Acuña of the León municipal slaughterhouse reported that a group of Mexican businessmen has bought land in León that it uses to fatten cattle and then sends them to Mexico for value-added production. Since Mexico has a free trade agreement with Nicaragua, it can do so with little or no tariffs. Foreign industrial processors have a distinct advantage in purchasing cattle, as they

buy in greater quantities and are able to pay in cash because of relatively higher incomes and profits, as well as greater access to credit, in their home countries. Thus, such practices are not only depleting available local supplies, but also removing the Nicaraguan market from the value-added process.

The result of decreased stocks from the export of live cattle is scarcity of live cattle for both industrial and artisan Nicaraguan meat processors. Such scarcity often results in daily losses to processors, who spend an entire day and gasoline driving from farm to farm, without finding any cattle to buy. Industrial processors are hurt by the export of live cattle because they are unable to pay cash in dollars and buy the same vast quantities of animals in bulk as the foreign buyers, thus putting them at a comparative disadvantage. However, artisan processors suffer most from this phenomenon, as the industrial processors are able to buy more cattle at once and at a higher price than artisan processors. There is no way for artisan processors to compete, and municipal slaughterhouses repeatedly reported that their artisan processors often must go from farm to farm looking for individual cows that were deemed undesirable by foreign buyers. Thus, the export of cattle affects not only the quantity of cattle available for domestic industrial and artisan processing, but also the quality. In sum, cattle sellers in Nicaragua prefer foreign buyers, followed by Nicaraguan industrial processors, and then local artisan processors.

Figure 5: Nicaraguan Beef Exports, 2000-2004



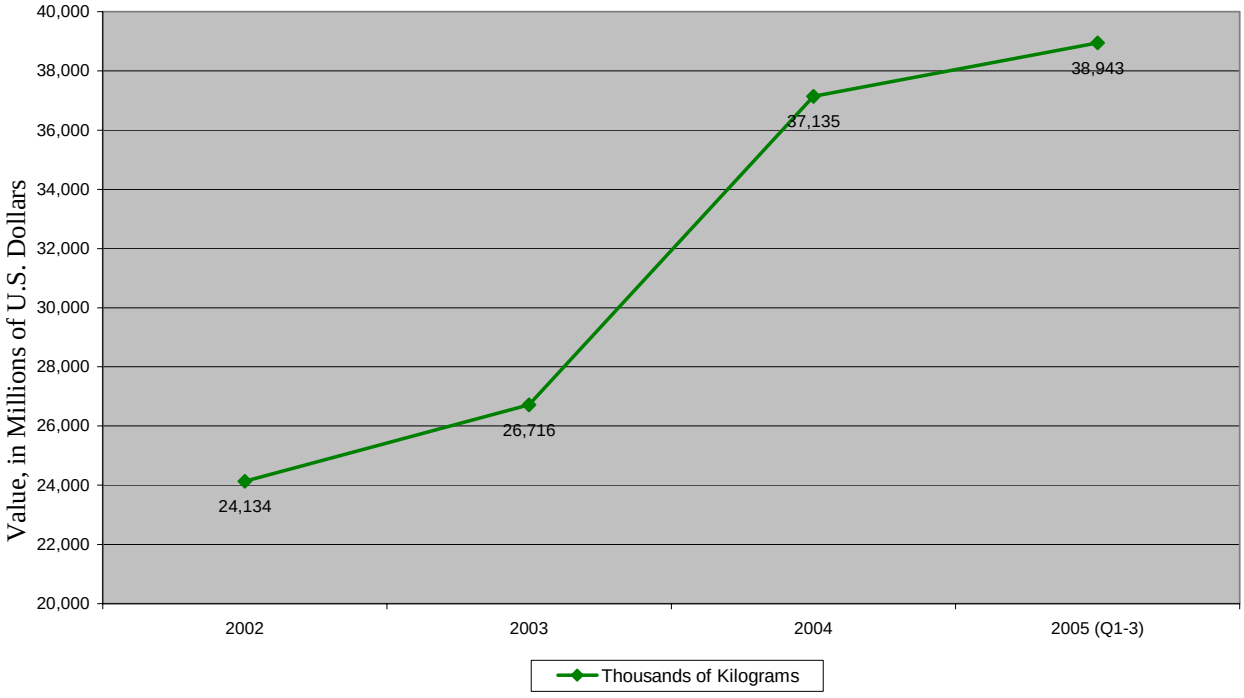
Sources: República de Nicaragua, 2002; Guerrero, 2005; Banco Central de Nicaragua, 2005c.

This dramatic increase in the export of live cattle has taken place in the past nine years. Until 1997, it was illegal to export live cattle from Nicaragua. This ban kept cattle prices artificially low in Nicaragua in comparison to prices in neighboring countries. Since the ban was lifted, industrial processors from nearby countries have bought Nicaraguan cattle in large numbers due to their relative low prices and high quality. The extent of the live cattle export problem is illustrated in Figure 6, which illustrates that live exports rose nearly 60 percent in just three years from 2002 to 2005.

Moreover, the emergence of preferential and free trade agreements has increased the demand for Nicaraguan beef in large international markets. This demand has resulted in increased demand for live cattle from the Nicaraguan industrial market, and increased production by Nicaraguan industrial slaughterhouses of meat for the export market. This dramatic expansion is displayed in Figure 5 above, which shows that meat exports increased over 100% from 2000 to 2004 (Aguilera).

Not surprisingly, the soaring demand for live cattle from both international and domestic industrial processors has resulted in a marked increase in the price of Nicaraguan cattle. Manuel Centeno, general manager of Nuevo Carnic, reports that his costs have risen by roughly US$108 per head of cattle since 2005. The higher cattle prices have resulted in increased domestic beef prices, thus causing a decrease in domestic consumption of beef because beef prices are rising much faster than incomes, despite the industrial processors' greater efficiency due to economies of scale. The price-sensitive nature of the domestic meat market is further strangling artisan processors, who do not have access to international beef markets and rely solely on the domestic market for their livelihood.

Figure 6: Export of Live Cattle from Nicaragua: 2002-2005



Source: Aguilera, 2005.

The rapid depletion of live cattle stocks at rates faster than they can be replaced is unsustainable and threatens the very existence of the market for cattle in Nicaragua. Every informant, whether in the public or private sector, and in both industrial and municipal slaughterhouses, reported that diminishing stocks related to the export of live cattle represent the greatest current threat to the Nicaraguan beef industry.

Recommendation
As with most endemic problems, there are no easy solutions for helping artisan processors. One partial solution could be the formation of processors' organizations or cooperatives, as previously mentioned. Such cooperatives would allow the artisan processors to buy collectively, securing better prices and giving them a better negotiating position than the currently possess as individual processors. Even so, this alone will not solve the problem of soaring prices, and it will not address the larger problem of diminished stocks.

While government interventions seldom represent optimal economic alternatives, the Government of Nicaragua ought to seriously analyze the current status of the country's meat industry and identify its alternatives for dealing with the rapidly increasing prices and the dramatic depletion of its cattle stocks. As the second-largest export industry in Nicaragua and the source of more than 10% of Nicaragua's gross domestic product, the government cannot allow the industry's lifeblood to be depleted as its current rate or a crisis will result.

Facilitating such a step and working with the government on potential solutions to this massive challenge is partially within the policy and government scope of PFID, and falls squarely within the mission and history of CLUSA. Although the obstacle deals with cattle and not processed beef, the two are unequivocally linked and must be addressed in order to address the obstacles at hand. These challenges are far too important for PFID to not consider in the design and implementation of its Nicaragua program.

<u>Slaughter of young and bred cattle.</u> We have seen how market conditions have caused the rapid depletion of cattle stocks due to the export of live cattle. Also of concern related to the depletion of cattle stocks is the slaughter of young and pregnant cattle. This obstacle is a directly caused by poverty among farmers and exacerbated by the complete lack of access to credit faced by ranchers. Cattle owners need immediate cash in times of economic hardship (such as a sick child) and cannot wait for their animal to reach its prime, profitable slaughter age. Thus, in order to get cash for the animal, the ranchers must sell cattle when they are underweight or pregnant. The sale of underweight cattle presents a direct economic loss for the farmer, who is sacrificing long-term profits for the immediate-term need for cash. The sale of bred cattle also directly cuts into farmers' long-term profits, as they would have a calf to raise if they could maintain the cattle just a few months longer.

The sale of such cattle represents a major macro-level problem for the Nicaraguan cattle and beef industries, as it further exacerbates the obstacle of depleting live cattle stocks. Very young calves and bred cows are often sold to these foreign processors, who wait until it is profitable to slaughter the cattle and then send them to their home countries for processing. In contrast, domestic artisan processors and even most industrial processors have no facilities for fattening

cattle or waiting for births. Thus, unless the young or pregnant cattle are bought by foreign industrial buyers, they will likely be slaughtered almost immediately and their future profits will be lost, not only for the farmers, but also for the value-added contribution of the Nicaraguan economy.

Recommendations

Access to credit would allow farmers to be able to borrow in times of need against their forecasted profit on the sale of cattle at a more strategic time. Microcredit schemes would not be appropriate for farmers, as the terms of repayment are typically very short-term and would not give farmers enough time to have their cattle reach peak profitability. Rather, a true rural credit strategy must be designed to alleviate the financial hardships facing ranchers and address Nicaragua's high interest rates, as compared with other countries in the region. The creation of a rural development bank is one of the primary demands of CONAGAN and is supported by both small and large processors alike. Specifically, former CONAGAN board chairman Daniel Núñez reports that Nicaraguan banks currently offer loans at rates of 16%, and that CONAGAN hopes to be able to offer rates of 9% via the proposed bank (2005). Such rates would still be higher than other countries in the region, which reportedly offer rates of 5-6% (Romero, 2005a).

If the lack of rural credit is not addressed, Nicaraguan cattle stocks will continue to dwindle. The implementation and formation of a rural development bank in Nicaragua is not only outside PFID's scope, it is also well outside of CLUSA's expertise. However, it will be important for both LSU and CLUSA to monitor the formation of this bank, due to its important ramifications for the status of the beef industry. The formation of such an institution should be addressed by future USAID and IDB projects.

Alternatively, USAID or other donors could seek to facilitate industrial/artisan partnerships, in which industrial slaughterhouses would provide seed capital to farmers in turn for preferential treatment. Such a relationship would result in higher quality stocks, which will be more profitable for both farmers and industrial processors. This way, the farmers would be in a better economic situation and the industrial processors could form relationships directly with producers. Such partnerships could potentially address the problem of preferential treatment toward foreign buyers of live cattle stocks, as this would create loyalty and a two-way business relationship between Nicaraguan industrial buyers and cattle producers.

FUTURE STEPS

PFID now faces the challenge of incorporating these recommendations into an action plan. This section addresses possible strategies for implementation. The recommendations have been divided into two categories: steps to be taken by PFID in the form of a PFID Action Plan, and projects warranting future funding. The first category addresses those recommendations that are crucial to PFID's ability to meet its goals and within PFID's mission and scope. The second category addresses projects that are well outside of PFID's mission, but would enhance PFID's effectiveness as complimentary USAID or CLUSA programs.

PFID Action Plan

Our team's recommendations for PFID first address which slaughterhouses can best benefit from the program. Once these have been identified, the remaining recommendations outline ways that PFID can best address those beneficiaries' needs: inspections, sanitation, cold-chain technology, and personnel training,

Beneficiaries

PFID aims to work with small and medium-sized processors. This goal prevents PFID from working with most industrial slaughterhouses. First, these plants cannot realistically be called small or medium-sized. Second, as we interviewed industrial slaughterhouse managers, we asked each to identify any challenges in market access. No industrial slaughterhouse staff identified a single technology or food safety challenge. Indeed, they each reported that their only challenge arose from dwindling supply, due to the rise in export of live cows.

In short, we recommend that PFID focus its program on the very smallest of industrial processors, Proincasa, and the very largest of municipal slaughterhouses, including Chinandega, Masaya, Granada, and Managua. Specifically, we encourage PFID staff to seek out slaughterhouses that do not have on-site MAGFOR inspectors, but have shown the desire and ability to invest in improvements in safety oversight, technology, and staff training, as these are the three areas in which PFID can assist. Although we did not have the opportunity to tour either Proincasa or the Managua municipal slaughterhouse, we were able to ascertain the most important aspect of each slaughterhouse's production: meat from each of them is distributed widely, but neither site has on-site MAGFOR inspectors. Thus, each plant has had to invest in cold-chain technology or accommodate artisan processors who have done so. This production expansion, coupled with their lack of government oversight, puts them in the same category as the public slaughterhouses in Chinandega, Masaya, and Granada. These five small and medium-sized sites have shown the ability and willingness to improve, but need guidance and expertise. With PFID's help, they will be able to keep their current markets and perhaps even expand, despite increased competition from domestic industrial plants and the threat of increased competition from international processors due to CAFTA. The following includes specific qualification of each facility we feel the PFID program should strongly consider as a beneficiary.

Proincasa. We were disappointed to not be able to tour the facility, but we were able to learn from CLUSA that Proincasa produces solely for the domestic market and is not interested in exporting. In other words, it currently faces no food safety-based obstacles in reaching its desired market. However, because Proincasa does not export, it does not receive regular MAGFOR inspections, according to Bernabela Orozco, MAGFOR Director of Food Safety. Therefore, its personnel could most likely benefit from participating in a Train-the-Trainer program in sanitation and meat safety. If the plant can publicize its quality improvements, it can better compete against the industrial slaughterhouses that are gaining public trust for their meat quality. Thus PFID can benefit Proincasa's ability to fully penetrate the domestic market. Later, if its management wishes to begin exporting, having participated in this training will be crucial to its ability to develop the necessary HACCP plans.

Municipal Slaughterhouses. PFID also faces significant challenges in working with artisan processors at municipal slaughterhouses. Ideally, PFID beneficiaries must not only show that they need the assistance; they must also show that they have the necessary resources to use the assistance to gain new market access. We were able to tour four of the largest five public slaughterhouses in Nicaragua. At each slaughterhouse, we considered the facility's record of improvement in three areas crucial to PFID success: government oversight, plant infrastructure, and staff training. Specifically, we sought evidence of a pattern of continual improvement, including the ability to secure funding for plant infrastructure projects. We also considered whether each facility's management would be able to continue upgrades to the point of expanding their current markets, with PFID's help. Of the four public slaughterhouses we toured, three met this criteria: Granada, Chinandega, and Masaya.

Granada. The Granada municipal slaughterhouse has an above-average record of government inspections, a very active technology-improvement program, and trained staff. Dr. Carlos Espinoza, the site's MAGFOR-certified veterinarian, is also the plant manager, and holds the respect of staff and processors alike. According to *fiel de rastro* Jimmy Villareal, Dr. Espinoza is well-known for his punctuality and work ethic, and usually stays past the end of his shift each day. Apart from the daily veterinary inspections and MINSA's occasional visits, the slaughterhouse also receives frequent inspections by five state health inspectors who circulate throughout public facilities in the department (state) of Granada. This was the only slaughterhouse we found to receive such state-level inspections. In terms of plant infrastructure, the facility is continuously improving. This year they have budgeted an upgraded grease trap filtration system and the installation of individual slaughtering cubicles to reduce the possibility of cross-contamination. For next year, a proposal for the installation of a methane gas bio-digester is currently under consideration by William Martínez, the city functionary in charge of the slaughterhouse and other public properties. Most ambitious is the slaughterhouse's potential privatization. As mentioned above, the city will most likely decide on this proposal within 2006. If the privatization is approved, Mr. Villareal will have newfound freedom in food safety improvements, which will allow them to raise their meat quality substantially. Such a move would put the Granada slaughterhouse on par with Proincasa as a small, private facility. Finally, Mr. Villareal organizes training courses for processors and their staff at least once every year. As most artisan processors have been slaughtering at that facility for 10 to 15 years, he feels that they are well trained at their craft. His history of organizing these classes shows his dedication to human capacity building, and his willingness to help facilitate training efforts. Slaughterhouse management has proven itself eager and capable to use PFID's expertise to improve their food quality standards and market access.

Chinandega. Chinandega has made great strides under its current manager, and holds promise to be able to continue making these improvements. Manager Pedro Salinas not only implemented the mandated pre- and post-mortem animal health inspections; he recruited an additional veterinarian so that each inspector handles only one species. A small cage-like corral has been installed to allow the designated veterinarian to carefully and closely inspect each animal. MAGFOR itself comes to the site on an as-needed basis to resolve animal health-related disputes between the veterinarians and local vendors, an arrangement unique to Chinandega. He is in the process of upgrading the kill rooms: he has recently purchased steel tables for cutting pork, and has plans to purchase similar tables for beef this year, as well as a suspension system to hang

entire carcasses and allow for better blood draining. Finally, he has implemented staff training programs and consumer education campaigns, as mentioned above, and reports dramatic improvement in the market's meat safety as a result. By seeking out partnerships with local universities and inspectors, and investing in food safety infrastructure, he has shown that the Chinandega slaughterhouse is capable of using PFID's expertise to continue to improve. We recommend that the site and the artisan processors who slaughter there be incorporated into PFID.

Masaya. Masaya boasts the best-funded slaughterhouse we saw, with a budget over twice that of Chinandega, the second in financial size (1.69 million córdobas in contrast with 800,000 córdobas). As mentioned above, it achieves this solvency through complete financial independence from the rest of the municipal government. As a "cost contained" entity, the slaughterhouse and its processors may decide to invest in whatever improvements are needed. In contrast, Granada must wait for the city to release funds, and Chinandega is given its annual budget by the city. Furthermore, their recent improvements show that they have not only the means for continued improvement, but the will to do so. When plant manager Carlos Martínez arrived, the slaughterhouse was in a state of disrepair and sloppy oversight. Mr. Martínez sought out and re-hired Adán León Caldera, who had worked successfully as the plant veterinarian many years before. He and the Masaya processors we interviewed all agreed that Mr. León Caldera's judgments were almost always respected, as his knowledge of animal health laws were undisputed. Their relationship with MINSA was also positive. For example, MINSA pays for site fumigation once every three months (they themselves pay for fumigation in the interim). In contrast, Granada's Mr. Villareal noted that MINSA has never helped his staff improve, but only come to look for violations. In short, the processors agreed that the rigor of oversight has improved during Mr. Martínez's short tenure (just over a year). In terms of plant infrastructure, the slaughterhouse currently pays 15,000 córdobas (US$870) per month for a loan Mr. Martínez took out for capital repairs upon arrival. Additionally, they have budgeted to make more capital improvements with their anticipated budget surplus, including an improved unloading zone for pigs, replacement of the cement slaughter room floors, an additional six pig stalls, improvement of the electrical system, an additional four lights to the property for security, and exterior paint for the slaughterhouse building. Finally, they processors are highly organized and experienced, which has helped them in training. Each of the four artisan processors we interviewed in Masaya had been working in meat processing for over 20 years. Trusting in their expertise, Mr. Martínez frequently sends memos to the processors recommending particular training for their staff. Overall, the staff and processors at the Masaya slaughterhouse are willing and able to make the necessary upgrades to their facility. What they lack is technical expertise, which makes them an excellent beneficiary for PFID. Several times in the course of our interview, processors expressed a desire to form a cooperative in order to share risks and learn new techniques. All the processors were concerned about the new competition they face from growing industrial processors, and are eager to reach MAGFOR standards so consumers will not favor frozen meat from industrial slaughterhouses over their product. They noted that joining together and improving their quality was the only way to stay in the market. Maritza Añamendi Martínez, a pork processor, encouraged her colleagues by saying, "Even though we are competing against big companies, they were small once too. If they grew, so can we." PFID offers the technical expertise and guidance they need, and can use.

Managua. We also recommend that PFID consider working with the Managua public slaughterhouse. Although we were not able to tour the plant, processors in other sites reported that meat from the Managua facility is widely distributed, but that the processors there struggle to compete with their clandestine and industrial counterparts. Chinandega's manager Pedro Salinas reported that Salvadoran processors slaughter at the Managua facility but sell the meat in El Salvador. However, Masayan processors all agreed that clandestine slaughtering is more widespread in Managua than in any other Nicaraguan city. With PFID's help, communication can be established between the Managua municipal slaughterhouse and the public slaughterhouses in Chinandega, Granada, and Masaya, to the benefit of all four facilities. Processors in the capital can learn from Chinandega's public health outreach campaign that effectively ended clandestine slaughtering. Meanwhile, processors in the other three sites could learn from Managuan processors' experiences with the cold-chain technology necessary to transport their products.

Unfortunately, the León slaughterhouse does not have the history of improvements to make use of involvement with PFID. In part, its desolation is a product of its budget. Though processors slaughter roughly half as many cattle in León as in Chinandega (roughly 15 and 30 per day, respectively), the León slaughterhouse's annual budget is roughly one-eighth that of the Chinandega facility (roughly 100,000 córdobas and 800,000 córdobas, respectively). As mentioned above, the City of León must take money from the slaughterhouse to maintain basic infrastructure, as it receives little or no financial support from the federal government. Every aspect of slaughterhouse life is affected. Leonel Acuña, the plant's *fiel de rastro*, listed "a little bleach" among the supplies they must struggle to purchase, but when as we watched the slaughterhouse being cleaned we neither saw nor smelled evidence of any cleaning chemical being used. Instead, surfaces were being scrubbed with a wire brush and rinsed with a garden hose. Similarly, processors and their staff received no training, and the administration seemed too preoccupied with basic functions to seek out greater government oversight and inspections.

Overcoming Processor Obstacles

PFID has a strong history of facilitating communication and cooperation between local government, universities, and slaughterhouses in other countries. Applying this precedent in Nicaragua would entail a threefold approach: increasing government inspection and oversight, and facilitating technology improvements and staff training.

Government oversight. PFID can make facilitate great improvements in small and medium-sized meat processors by establishing a strong relationship with the federal government on two fronts: strengthening health inspections and facilitating the elimination or changing of Executive Decree 158. First, government inspection can be improved by working with MAGFOR. The ministry has just begun an IDB-funded project aimed at expanding and modernizing their services. If PFID establishes a strong relationship with MAGFOR now, before the IDB funds are used, some financial arrangement may be made to increase the number of MAGFOR inspectors. Production at these five plants will have to increase to allow them to fully finance an on-site inspector. However, there are myriad cost-sharing possibilities. Even if this IDB program cannot be used for full-time inspectors at these five plants, each plant has shown its ability to seek out external financing, and PFID can help them make these necessary connections. Regardless of whether the financing arises from MAGFOR's IDB program, or from other sources, increasing

MAGFOR inspection at these sites should be one of PFID's greatest priorities. Second, Executive Decree 158 was established in 1986, when the political and economic climates of Nicaragua were vastly different than they are today. The law is no longer necessary and in fact prevents small processors from expanding to the point of being able to invest in appropriate safety measures, by limiting them to processing sub-standard cattle. Establishing a strong relationship with MAGFOR is a good first step in addressing this decree. Our team found Bernabela Orozco, MAGFOR director of food safety, to be very approachable and open to PFID's goals. For these reasons, we recommend that PFID begin working with the federal government by establishing a stronger relationship with Ms. Orozco, and asking for her guidance on addressing the obsolete decree.

Technology. We recommend that PFID assist in the development of cold-chain technology at the identified target plants. PFID has a successful precedent of lending guidance and design expertise in cold-chain technology for Eastern European poultry cooperatives. Similar leadership is needed for these five slaughterhouses. Each has made strides in technology, but much more investment and know-how is needed. Part of this effort should entail facilitating communication between these processors. The different plants have made their improvements in different areas, and sharing this knowledge will help them all. For example, the Chinandega slaughterhouse found a grant to repair their methane bio-digester, for much less money than the estimate received by the Masaya slaughterhouse (US$11,000 and US$20,000, respectively). The Masaya plant staff could greatly benefit by learning of Chinandega's contacts. Also, the Managua plant has accommodated processors who wish to use cold-chain technology to transport their meat to El Salvador. Artisan processors elsewhere should have the opportunity to learn from this experience, so they can expand their market into more distant areas. Also, PFID can help these plants connect to external donors and financing to find the most affordable path for the necessary upgrades.

Training. Finally, similar communication links among small and medium-sized processors and with external organizations will help in staff training. The Chinandega slaughterhouse management has successfully begun a training program with the University of León. Masaya, Granada, and Managua processors, and staff at Proincasa, could benefit by such a system being created in their cities. The establishment of PFID's Train-the-Trainer (TtT) program, connecting each town's artisan processors with local university faculty, and communication among the processors, to learn from each other's experiences with the program, will help all involved. The TtT program is a vital part of PFID, and should be developed with the needs of these five plants in mind.

Other Related Development Projects

As is the case with most development projects, PFID addresses cross-cutting obstacles that affect and are affected by a variety of development issues. Thus, PFID could potentially benefit from other, complimentary projects. Although its work can succeed without this parallel work, any work in these connected fields will enhance its effectiveness. Specifically, we recommend that future work be explored in the areas of improving public infrastructure, bolstering local cattle stocks, and securing access to credit for farmers and processors alike.

Public infrastructure. Nicaragua's dry and wet seasons each present challenges to the public services that meat processors need to stay in business. In the wet season, the greatest challenge seems to be road conditions, as highways occasionally wash out. Nova Terra's Erick Matus noted that when a road becomes impassable, his slaughterhouse must wait until the end of the rainy season to receive any more cows from the effected area. Unfortunately, this severs the supply chain precisely when cows are in the best condition for slaughter. During the dry season, fire can become a significant threat. Noelia Sáenz, also of Nova Terra, recounted her recent experience with an out-of-control brush fire that spread to the edge of Nova Terra's property. The staff called the fire department, but by the time help arrived, the staff had already saved the building by beating back the flames with brooms. Both of these infrastructure challenges threaten the continuity of the supply chain. USAID or another comparable funder can contribute greatly to the beef industry's sustainability and growth by improving these areas.

Export of live cattle. As noted above, every informant we interviewed, including professionals in both the public and private sectors, pinpointed this as the greatest current threat to the industry. Small processors in particular are unable to compete at auction with larger, foreign processors who buy in quantity. We recommend a two-prong approach to this problem: increasing local access to credit and facilitating the formation of processor cooperatives, both of which are discussed in greater detail below.

Access to credit. Our informants all attributed the export of live cattle to ranchers' lack of access to credit. The interviews we conducted indicate that ranchers who are facing financial hardship often sell calves for immediate cash. Local processors note that these calves are much too young for them to purchase and slaughter. This situation results in foreign processors, who have access to credit in their home countries, buying calves, waiting until they are ready to slaughter, and then processing them for a large profit. CONAGAN, the national cattlemen's association, is intensely lobbying the federal government to create a rural development bank, but little progress has been made. Every major party support the idea in the legislature, but the executive branch and multilateral financial institutions oppose it, because similar institutions have failed in the past in Nicaragua (*El Ganadero*). Transparency assurances, such as beneficiary ownership, rotating, elected leadership, and strict donor oversight, could form the basis of a compromise. Regardless of the format, access to credit is crucial to the survival of the Nicaraguan beef industry. There are myriad examples of successful community credit and savings institutions in ranching areas worldwide. We recommend that potential donors and NGOs be consulted to design such a scheme to be appropriate to the Nicaraguan case.

Processor cooperatives. A second obstacle to small local processors' ability to compete with foreign buyers at auction is size. Small processors simply do not have resources or use for as many cattle as their larger competitors. Thus, ranchers always prefer selling to corporate customers, who will buy all of the animals that they wish to sell. Artisan processors in Masaya strongly expressed their interest in forming a processor cooperative. With such a cooperative, they could buy larger quantities of cattle, resulting in better prices. They could also slaughter collectively, resulting in a more efficient process. They noted that they would need guidance in forming such a group and seeking financing for group investments. Facilitation the formation of cooperatives is well outside of the scope of PFID. However, it is precisely the type of project CLUSA usually oversees. We believe that great progress could be made for small processors

through cooperative formation. We recommend that PFID-Nicaragua staff seek funding to initiate such an effort.

CONCLUSION

In conclusion, PFID must adequately target appropriate beneficiaries and help them overcome their food-safety based obstacles in order to reach its program goals. To summarize, we recommend that PFID focus on five slaughterhouses: Proincasa, and the public slaughterhouses of Managua, Masaya, Granada, and Chinandega. By implementing in Nicaragua the model developed in Eastern Europe that connects processors to experts, PFID can facilitate the necessary modernization and expansion of these processors. As this model is implemented, we recommend that special emphasis be put on three areas: establishing strong relationships with the federal government, guiding investment in cold-chain and sanitation technology, and developing a robust Train-the-Trainer program in the processors' cities. This work could be further enhanced by simultaneous development projects in complimentary areas: public infrastructure, access to credit for small agribusinesses, and the formation of cooperatives. We believe that if PFID focuses on these five beneficiaries and these three program areas, the project will meet its goals of industry development, relationship building, and food safety improvement.

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Appendix A: In-Country Schedule

Sunday, March 5, 2006:
10:00 PM: Arrive in Managua

Monday, March 6, 2006:
9:00 AM: Managua: Meeting with CLUSA Director Carlos Sánchez and Coordinator Tania Casaya
2:00 PM: Managua: Meeting with Nuevo Carnic General Manager Manuel Centeno Cantillano

Tuesday, March 7, 2006:
10:00 AM: Nandaime: Meeting with San Martín Plant Manager Juan Carlos Salinas Sánchez

Wednesday, March 8, 2006:
2:00 PM: Managua: Meeting with CONAGAN Board Chairman Jaime Armando Lovo Moncada and General Manager Dr. Ronald Blandón B.

Thursday, March 9, 2006:
9:00 AM: Granada: Meeting with municipal slaughterhouse *Fiel de Rastro* Jimmy Villareal

Saturday, March 11, 2006:
9:00 AM: Tipitapa: Meeting with Nova Terra Production Manager Erick Matus, HACCP Director Gioconda I. Matus J., and Export Logistics Coordinator Noelia Sáenz.

Monday, March 13, 2006:
10:00 AM: Juigalpa: Meeting with MACESA HACCP Team Manager Nicolle Auffret

Tuesday, March 14, 2006:
10:00 AM: León: Meeting with municipal slaughterhouse *Fiel de Rastro* Leonel Acuña and Manager Carlos López

Wednesday, March 15, 2006:
10:00 AM: Chinandega: Meeting with municipal slaughterhouse Manager Pedro Salinas

Thursday, March 16, 2006:
9:00 AM: Masaya: Meeting with municipal slaughterhouse Manager Carlos Martinez, Veterinarian Adán León Caldera, pork processors Edwina de los Ángeles and Maritza Añamendi Martínez, and beef processors Hermán Henríquez Gaitán and Arnoldo Solórzano Reyes

Friday, March 17, 2006:
9:00 AM: Managua: Meeting with MAGFOR Director of Food Safety Bernabela Orozco

Saturday, March 18, 2006:
8:15 AM: Departure from Managua

Appendix B: Detailed Interview Summaries and Notes

CLUSA Meeting
6 March 2006, 9:30 AM
Interviewees: Carlos Sánchez, Tania Casaya

Overview: CLUSA history

CLUSA International first started working in Nicaragua in 1995 with a 3-year pilot project replicating a successful CLUSA El Salvador project, which centered on developing non-traditional and certified-organic products for export. This was a 3-year pilot program. In 1998, CLUSA International declared CLUSA's Nicaragua pilot a success and began the process of establishing a separate CLUSA Nicaragua. In 1998, Hurricane Mitch devastated Nicaragua, so CLUSA began putting out proposals for development projects to reactivate the agricultural sector in the Caribbean and Northern regions. CLUSA Nicaragua won a 2-year USAID-funded contract beginning in 1998, which benefited 17,000 people, and had four foci: supervised credit, coffee quality improvements through access to technology, technical assistance for soy farmers, and watershed management, which included reforestation (1 million trees were planted) and teaching best practices to farmers, such as maintaining land fertility and not burning down the forests.

There was a 2-year process to establish an independent office CLUSA Nicaragua office, so in 2000, the process was completed and CLUSA Nicaragua began taking independent contracts. Starting in 2000, CLUSA Nicaragua had five overarching themes that they worked towards through five programs. The themes included raising family incomes to work toward food security, increasing local capacity through access to technology, food safety, and sustainability. The five programs included Plan Internacional (5 years), farmers working for food security, food security for the coffee farmers, natural reserves and ecotourism, and dairy food safety.

CLUSA starts PFID

More recently, CLUSA Nicaragua also picked up the Partnership for Food Industry Development (PFID) contract from Louisiana State University Agricultural Center (LSU AgCenter). PFID looks at food safety through transmitting MAGFOR regulations to processors. This program focuses specifically on increasing food safety standards and improving local capacity, through business, income generation, local capacity improvement, and access to technology. The government does not have enough human capacity to inspect all slaughterhouses, thus processors themselves must take the lead in improving their food safety standards. Thus, CLUSA serves as an intermediary between government, processors, and universities. One important aspect of this program is its train-the-trainer (TtT) activities. TtT aims to increase local capacity by providing training to the locals with the most expertise in the sector, who will then disseminate that information via workshops hosted by the government and universities. Within industry, there is a mentality in which the players do not share information with each other. Thus, CLUSA fills the role of facilitator in this program.

Participant selection and industry challenges

Their selection process of companies for the PFID program is based on their knowledge of the industry and previous contacts. There are very few (industrial) slaughterhouses – five, to be specific, and all are authorized to export to the U.S. There is growth in the industry and prices are good right now. There are two overarching goals right now for the Nicaraguan meat industry: to allow industry to grow and to raise the prevalence of safe meat domestically to contribute to better consumer health. The biggest industry challenge cited by CLUSA is that "the majority of processing plants to do not work at 100% capacity, so that is one of their main goals." They also noted that raising processor awareness of what good animals are will make them demand more and will raise standards. Furthermore, once the processing plants raise the quality of their output, this will increase the quality of meat available locally, which will increase consumer knowledge of meat quality and raise local demands. This is a very trickle-down point of view.

For example, PROINCASA is small but growing – it's completely focused on the domestic market so it does not have a HACCP plan. They are family-owned and not interested on expanding to the international market at this time – their goal is slow, steady growth.

Municipal slaughterhouses and attitudes toward cold meat

The industry here is medium to large. The small processors are the municipals and departmental slaughterhouses, which process 50-100 head of cattle per day. They produce only enough volume for local demand. They have no cold chain, but rather are a 'hot market.' They need equipment, which the municipalities would have to fund. Thus, the PFID project will not be working with them because there is too much prior investment required from the municipalities.

Moreover, CLUSA cites lack of food safety as something cultural. They say people (housewives) need to be educated about the proper handling and preparation of cold and frozen meat in order to increase demand. Since consumers aren't familiar with the product, they demand warm meat (i.e. no cold chain).

All municipal slaughterhouses must have a public health permit. Inspections are conducted, but only periodically, perhaps 3 times a year, which is a modest improvement compared to inspection procedures in the recent past.

New industrial slaughterhouses? And reasons for lack of investment.

PROINCASA is the only new industrial business. It is a few years old, family-owned, and purely for the domestic market.

Other than PROINCASA, there has been no entry to the industrial slaughter market in Nicaragua in the recent past. Mr. Sánchez attributes this lack of investment to a depressed meat industry (worldwide), weak gene stocks in Nicaragua (relative to the international market), bad management, and overall market weakness from mad cow disease, which decreased worldwide beef demand. Specific to Nicaragua, natural disasters and political instability have driven away

potential international investors. He hopes that if PFID is successful, current industrial slaughterhouses' productivity and revenue will rise, resulting in a more attractive sector for investment.

CAFTA: how will Nicaragua's meat sector do?

Mr. Sánchez says industry has the responsibility to make the industry more competitive. He also says civil society must represent the producers' needs to government and facilitate cooperation among producers for the sake of access to technology. He says the government must also enforce regulations so the quality is not sacrificed. Finally, Mr. Sánchez says the government must cooperate with the financial sector to ensure access to competitive credit (i.e. fair lending rates and access).

In this context, CLUSA offers producers options, but the initiative must come from the producers themselves. CLUSA opens the opportunity for the producers to take advantage of capacity building.

Dr. McMillin (LSU) suggested having a 2-tier program, in which one tier is targeted to municipal slaughterhouses and the other is for industry. This way, both can learn based on their current level of knowledge.

What about the clandestine slaughterhouses?

The clandestine slaughterhouses are in remote areas with no access, thus making Ministry of Health inspection 'impossible.' The municipalities manage a permit system, in which an individual can ask for permission to slaughter a specific animal. "Above all, the permit system is to avoid theft of cattle (i.e. property issues); it in no way is designed to address food safety or animal health concerns. Addressing the needs of this sector would require a much broader program aimed at popular education." Such a program would have to be initiated by the government because due to lack of financial incentives, there would be no role for industry.

Government agencies involved in food safety and PFID

They work with the Ministry of Health (MINSA), Ministry of Agriculture and Forestry (MAGFOR), and the Ministry of for the Development of Industry and Commerce (MIFIC). MIFIC is in charge of creating industry norms, with the input from MAGFOR and MINSA. In contrast, MAGFOR is in charge of enforcement. "All of the current food safety laws were created at the behest of the international market.

Since MAGFOR does not have sufficient economic resources to fund its inspectors, each industrial plant pays MAGFOR the costs associated with the on-site inspectors (i.e. their salaries). While the risk of conflict of interests exists, Mr. Sánchez does not believe it is a problem because it would be self-destructive to allow the site to break regulations and potentially lose its international market.

The municipal slaughterhouses have *fieles de rastro* financed by the local government. They only slaughter sub-standard cows, which are identified by health reasons or temperament.

To end, CLUSA stated that they think the industry will develop its capacity, increasing demand. Currently, they note, 80% of production is for the export market, which corresponds to cattle ages 4-30 months. The other 20% is produced for the domestic market, and consists of cattle over 30 months of age.

Nuevo Carnic (Industrial Slaughterhouse) Meeting
6 March 2006, 2:00 PM
Interviewee: Manual Centeno Cantillano

Overview: Nuevo Carnic

Nuevo Carnic is an industrial slaughterhouse that is 42 years old. In the beginning, it was property of President Somoza, but when the revolution took place, Nuevo Carnic became state property. It passed into the hands of the workers and almost had to close, as they had no management skills and thus very poorly ran the company. Later, under Violeta de Chamorro, it was passed back to private ownership. It has grown since then, such that it is in very financially strong. Mr. Centeno hopes the government keeps creating opportunities because if not, they will lose business to Mexico and other countries. Specifically, he is worried about the export of live cattle to other countries, which exports Nicaragua's ability to produce value-added products.

The entire plant directly employs 1,800 people. Mr. Centeno stated that, 'La producción de la carne es noble,' or 'Meat production is a noble business.' They export US$4 million in cattle per month, and produce US$1 million for the domestic market, resulting in their 80% export, 20% domestic breakdown.

Production and market

Their main market for industrial cuts is the United States – 99% of the ground chuck produced at Nuevo Carnic goes to the U.S. market. They also process select cuts for export to El Salvador (50%), Puerto Rico (25%), and Honduras (less than 25%). They produce viscera for a variety of markets. Specifically, they produce green viscera, including tongue and tripe, for the Asian market, including Japan, China, and Taiwan. They also produce red viscera, including heart and kidneys, for export to Mexico and Guatemala.

The market conditions are currently good, especially considering the recent discovery of foot-and-mouth disease in Brazil and Argentina.

Challenges for Nuevo Carnic's market

Mr. Centeno identifies two overarching problems for the industrial slaughterhouse business:

1) Over harvesting of calves. The biggest challenge in the industry right now is the over harvesting cattle at young ages. Calves are worth $250/each, while once they finish growing, they are worth $500. This is a problem because the cattle producers face extensive poverty, and thus are forced to sell their calves at a young age so they can have hard cash to feed their families.

2) International competition. From the processors' standpoint, the over harvesting lowers the supply of mature animals on the market, which creates a shortage of slaughter-age cattle and thus increases prices for the processor. This is especially concerning when looking to the international meat markets. The largest meat producers included Australia, New Zealand, Canada, and Uruguay. Uruguay poses the largest threat to Nicaraguan beef because even though it is much further from the final market (i.e. the US), their transportation costs are offset by prices of $300/head for high quality cattle (i.e. with good genetics) and the Uruguayan meat thus takes a comparative advantage over Nicaraguan beef.

Another challenge related to international competition is the quality of Nicaraguan cattle genetics. Mr. Centeno indicated that President Somoza single-handedly had improved the genetic quality of Nicaraguan cattle, due to his aggressive pursuit of genetics from the international market. At that time, Nicaragua was the economic leader in beef quality in Central America. This gave the farmers ability to produce higher quality animals. When the Sandinistas came to power, food safety standards declined and the U.S. revoked their export ability. However, under Somoza, Nuevo Carnic had exported to the United States. Once the Sandinistas left power and the plant was returned to private hands, the plant was reconditioned to fulfill USDA standards. Since then, USDA reauthorizes them for export annually – specifically, February 21st of this year, Nuevo Carnic was reapproved for export.

Food Safety Processes and Oversight

Mr. Centeno notes that Nuevo Carnic has a 3-prong approach to ensuring food safety. **MAGFOR inspectors** verify daily that the cows are healthy and well-treated, that food safety is adequate, and that HACCP standards are continuously achieved. **Other countries' inspectors** also come to audit them for export, except Asian countries, which accept U.S. certification in lieu of sending their own inspectors. Countries that send teams to certify Nuevo Carnic's inspection process include El Salvador, Guatemala, and Panama, to name a few. The plant also has 450 **quality control employees**.

Plant capacity I

When Mr. Centeno arrived at Nuevo Carnic in 2004, the plant processed 300 head of cattle per day. By the end of 2005, the plant had expanded, such that it had the capacity to process 464 head of cattle per day, or 11,000 per month. Mr. Centeno stated, "Right now we are operating at capacity, except for the dry season when farmers don't sell their cattle because they are waiting for them to regain weight." Specifically, he notes that the rainy season (winter) starts in May, which causes the cattle to briefly suffer from diarrhea and lose more weight. However, they quickly recover and by August, the busy season for purchasing cattle begins because the cattle have gained considerable weight, and are thus worth more. The high season for cattle lasts until

January. February to July then represents the low season. Mr. Centeno notes that this variability is perfectly normal for the industry and he makes his business plan as such.

Areas for improvement

Mr. Centeno notes, "The market for meat is extremely broad – it is the supply that is the problem."

He notes that the key to increasing and improving production is educating farmers. He says this consists of three factors:

1) Nutrition. He noted that without proper nutrition, the animals cannot grow well. He noted that this was better under Somoza because he imported higher-quality grains and feed. He also suggests that the government create irrigation programs to improve pasture quality and abundance.

2) Animal health. The government needs to promote human capacity building, including training for vaccination, animal health, disease control and good animal production practices.

3) Genetics. Naturally, Mr. Centeno noted that animals in hot climates are smaller than in cold climates. European and Australian breeds represent the largest animals with the highest quality meat. The government needs to support farmers by facilitating the importation of semen from the United States and Australia.

With these three factors, he believes Nicaraguan meat will become better and more abundant. He stated there have been programs in the past to help farmers, but that they were not very well implemented and the improvements were not maintained.

Credit issues

Cattle producers slaughter or sell their animals because they themselves are hungry and thus have an immediate need for cash. The government needs to create methods to provide loans to farmers so they can take better advantage of their herd, wait longer to slaughter, and retain more of the value-added benefits. This will further increase their household incomes.

Plant capacity II

Recently, Mr. Centeno invested in new equipment to expand the plant's capacity from 464 head/day to 650 head/day. This expansion increased not only daily production, but efficiency, as well. Specifically, better use of warehouse space and refrigeration technology has allowed him to reduce process time from 3 days to 1 day, effectively allowing the refrigeration part to process 3 times more. Before, they had one warehouse for the current day's production and one warehouse for storage during the low season. Mr. Centeno realized that was limiting their daily production, so he decided to use both for current production and sell all of their product immediately. Rather than discarding the old equipment, he reconditioned it and currently has it as a back-up in case of any system failure. His new equipment is only 3 weeks old. He noted

that he has the alternative to use both the old and new equipment, but for now that is not feasible because there is not enough supply of cattle to operate at that high of volume.

Mr. Centeno reiterated that "the problem is not demand, what must be done is production." (27:38). The lack of supply has caused prices to increase dramatically. Last year, he paid suppliers 32 córdobas per kilo, and now he is paying 41 córdobas per kilo. This increase of 9 córdobas per kilo translates to an increased expense of about US$108 per head of cattle, which he stated comes directly from his margin.

What is he doing with CLUSA?

Nuevo Carnic's main connection to CLUSA has been through their organic meat program, which is the only organic meat certified in Central America. They have had difficulties because the organic certification process is long and complicated process. This process requires the animal be free of chemicals and takes three generations under organic condition until certification is granted. In addition to treatment and condition of animals, the pastures in which they graze must also be certified organic. This is difficult considering the processors do not raise their own cattle.

Mr. Centeno's background

He is an economist by training and is a CPA. He holds a master's degree from Central American Institute of Business Administration (INCAE), which was established and is managed by Harvard University. Up until now, he has worked as an international manager and consultant in Caracas, Central America, and the United States. He has no formal training in the meat industry and this is his first experience managing in this setting. He became involved with Nuevo Carnic because he knows the current owners, who had problems with their previous manager and offered him the position.

CAFTA: Trade-based challenges

The methods by which CAFTA is implemented are critical. If certain products come to a country that are not produced by the local market, that is great. For example, tropical products have a tremendous opportunity with CAFTA because they are not produced in the United States. The greatest things in life are risks, he said. In turn, some people are afraid of the role of multinational companies, but in the end, he stated that the given country will produce more, so it does not matter who produces it. To emphasize his point, he stated, 'la producción es el diablo ahorita (currently, local production is the devil).'

He also noted that the biggest risks related to CAFTA trading potential comes from Uruguay. Since the prices are cheaper, the United States could prefer Uruguayan beef, despite an FTA with Nicaragua. This is especially problematic when coupled with Nicaragua's rising input costs. It is the Nicaraguan government's job to manage these risks through access to credit, genetic improvements, and animal welfare. These strategies will enhance Nicaragua's competitiveness internationally by increased product quality. In the short-term, there is no political will by the Nicaraguan government to explore any of these alternatives.

Public sector challenges in Nicaragua

Mr. Centeno stated that corruption at all levels of government is an embarrassment and causes enormous problems. Nicaragua is a very corrupt country and has the worst corruption in Central America. Mr. Centeno has no idea how this can be fixed. He says it is a cycle and is a matter of individual choice of the public sector employee who chooses to operate dishonestly.

He gave a solid example. He returned to Nicaragua with enthusiasm to help his country. So, he bought a farm. He had a lawyer look over the papers, and he said everything looked fine. However, when he went to pay his taxes, the public official told him the appraised value of his land was 10 times what he had fairly and actually paid (they claimed US$3 million instead of US$300,000). The corresponding tax difference was $15,000 for a $3 million farm, as opposed to $4,000 for the $300,000 that he actually paid. The public official told him, "I can fix this for you, but I need to make a living too." Thus, since Mr. Centeno was 'saving' $11,000, the public official stated that in order to fix the error, he directly receive half of the $11,000 'savings', or $5,500. The official would not rectify the situation without this bribe, thus Mr. Centeno was forced to pay it, or else pay taxes on a $3 million estate. Then, he went to register the land that was his and that public official claimed that the land did not appear in the land registry, and thus requested a bribe to register the land, even though he had surveys and maps with him to support his claim. If he had not paid that bribe, then he would essentially have forfeited all he had spent to date on the land, taxes, and associated bribes.

The bottom line of this story is that Nicaragua cannot compete because of inefficiency, largely caused by corruption. Mr. Centeno believes, corruption is not endemic Nicaraguan culture, but rather is perpetuated by a series of individual choices public officials often make. He noted that the honest man lives on his salary and eats beans and rice, while the dishonest man wants to live beyond his means. Thus, in order to do so, he joins the public sector and takes bribes because drug trafficking is the only other option and is very dangerous.

To further his point on corruption, he noted that the National Supreme Court recently had $600,000 go completely unaccounted for.

Despite all of this, Mr. Centeno feels that most Nicaraguans have an indomitable work ethic, so the country will continue to progress.

It is worth noting that after we turned off our recorder, Mr. Centeno made an off-hand comment about how Lake Managua so polluted, they should combine its indigenous name (Xolotlan) with the name of Lake Titicaca in Peru/Bolivia to best describe its current situation, resulting in Lake Xolocaca. This roughly translates to "full of feces." In mentioning this, he commented that Nuevo Carnic dumps all of their animal waste directly into Lake Managua.

San Martín (Industrial Slaughterhouse) Meeting
7 March 2006, 10:00 AM
Interviewee: José Luis Salinas

Background

San Martín has been in business for 27 years (i.e. since 1979). It was formed by a group of farmers who got together to start the slaughterhouse. San Martín has been involved in the export market from its founding, although it has only been certified to export to the U.S. since 1992. USDA recently recertified San Martín for the next year. San Martín is also certified for export to Central America, Mexico, Japan, Taiwan, and Canada. Although San Martín is not certified for export to Europe, which has much more stringent food safety requirements, it is currently making necessary adjustments to achieve that goal.

Food safety

San Martín prides itself in excellent food safety. Their dedication is reflected in their large food safety staff of 35 people, 12 of which are staff dedicated exclusively to the HACCP team. San Martín is food safety certified by a number of international codes, including HACCP, SOP, and Good Manufacturing Principles (GMP). They also are involved in practices to combat BSE and other animal diseases.

Production

San Martín purchases the cattle it processes directly from farmers. They currently have 5,200 suppliers of cattle throughout Nicaragua.

They have a maximum production capacity of 930 cattle per day, although current production is lower. In January, San Martín processed 16,000 cattle, or about 640 per day. In February, they processed 15,000 cattle, or about 600 per day. This decline is a result of Nicaragua's summer, or dry season, in which cattle producers are less willing to sell cattle because of low weights. During the high season (especially November-December), San Martín processes 20,000-22,000 cattle per month, or about 880 per day. In order to address the seasonal swings, San Martín has an adjacent pasture and barns, where it holds cattle when there is excess supply in the high season, and keeps them for slaughter until the low season. Thus, although their low season production is considerably lower than their high season production, San Martín's production swings are less volatile than the other processors in the industry.

Opportunities

San Martín sees CAFTA as a tremendous opportunity for their business to grow. Since they already have an excellent distribution network in Nicaragua and a solid export relationship with all of the CAFTA countries (especially the U.S.), San Martín believes they will be able to increase production and profits as a result of CAFTA. To support their confidence in growth, San Martín is investing in better technologies and infrastructure to further increase their capacity, despite the fact that they are currently producing below capacity.

On a macro level, Mr. Salinas sees great opportunity for Nicaraguan beef. He noted that the prices are among the lowest in the region, yet the quality is among the highest. He also felt that since the country is relatively stable, that the volatility that has plagued its past is no longer an issue to potential trading partners.

Challenges

Mr. Salinas noted several minor challenges for his company in the future. The first is the continual challenge of staying up to date with technology used in the global market. This is directly related to staying competitive with the other 4 large meat processors in Nicaragua, as well as international meat processors.

The second challenge Mr. Salinas identified was related to farmers. Specifically, he felt that the cattle market is particularly difficult right now, as there are few farmers relative to the demands of industry businessmen. As a result, cattle prices have risen and the national stock has decreased. Mr. Salinas believes that the government must provide assistance to farmers to motivate them to sell their cattle for slaughter at more opportune times, rather than during times of financial necessity. The government should develop programs to give farmers better access to credit and provide farmers with training on raising quality animals and food safety. By doing this, Mr. Salinas is confident that Nicaragua's entire beef industry, including producers and processors, will be a winner in international trade.

Could other farmers follow San Martín's roots and form such a strong business?

Mr. Salinas is confident they can. He noted that farmers would need to receive training on business and marketing, as well as certification for the variety of international regulations that exist in meat production and processing. However, despite these necessary precursors, Mr. Salinas does feel that with assistance and drive, Nicaraguan farmers could follow in the footsteps of San Martín's founders.

CONAGAN (National Cattlemen's Association) Meeting
9 March 2006, 8:00 AM
Interviewees: Jaime Lovo Moncada and Ronald Blandón B.

Background

CONAGAN was formed in 1994 as a World Bank recommendation dealing with President Chamorro's privatization initiative. To date, CONAGAN has operated under four different Nicaraguan presidents. CONAGAN serves as a umbrella organization for its six member organizations, which include FAGANIC (Federación Ganadera Nicaraguense), UNAGGE, UNILECHE, CAP, EXPICA, and UNAG. Member organizations represent both dairy and cattle industry groups from around the country. The two most important member organizations are

UNAG and FAGANIC.[10] CONAGAN holds elections for its board members every 2 years, with Mr. Lovo being elected to the presidency just one month ago.

CONAGAN serves as a meeting point for their affiliated organizations. There is no membership fee for CONAGAN, but there is a fee for the individual organizations. However, Mr. Lovo noted that the fees are more symbolic than anything – for FAGANIC, it is 1,200 córdobas per year (US$70/year). According to the census, there are 100,000 farms in Nicaragua – 50,000-60,000 producers on those farms are members of one of the six member organizations.

2 facets of CONAGAN's work

There are two overarching facets to CONAGAN's work. The first facet is to represent the needs of their constituents in the government and public debate arenas. This facet includes press conferences and formal lobbying activities. CONAGAN meets regularly with the legislature and has met with the President on several occasions, as well, to convey its members' voices to places of power.

The second facet is to assist their member organizations with programs to help the members. Two projects were mentioned as falling under this category. The first is the organization of major, biannual cattle and dairy fairs. The second project is a farmer identification program, in which the farmers receive newsletters of upcoming events and commercial discounts and other incentives from partner organizations and businesses. Likewise, this program allows CONAGAN to create a database of all members.

CONAGAN's 4 demands

CONAGAN has four clearly identified demands. These demands were on print materials they gave us (including their quarterly magazine), as well as an enormous banner outside their building. The demands have been presented to the Nicaraguan government officials. They include:

1. *To create an agricultural and rural development bank.* CONAGAN believes this is a necessity to address the endemic lack of credit that their producers (members) face.
2. *To guarantee security of member property rights*. Land invasion has been a problem, so farmers have little incentive to invest in their land for fear their investments will be lost.
3. *To guarantee the protection of the environment.* CONAGAN and its members recognize that the deterioration and elimination of natural resources are affecting their ability to produce. As such, CONAGAN has proposed to the Nicaraguan government that 20% of farm lands be dedicated to forestation, to the tune of 1.5 million hectares.
4. *To ensure fair marketing for member production.* CONAGAN feels its members need to increase competitiveness, but their members cannot make such investments alone. Thus, this component would entail government-sponsored human capacity building to enhance competitiveness in free trade.

[10] While it was not mentioned in this meeting, it is worth noting that UNAG and FAGANIC are historically the ideological extreme industry groups, representing the far-left and far-right, respectively.

CONAGAN's lobbying efforts

CONAGAN's most recent lobbying efforts have focused on three proposed laws that they feel will conversely affect their constituents. These laws include the following:

1. Law to regulate costal areas (including rivers and lagoons). In this law, all area within 50 meters of a river would become property of the municipality. This would be bad for farmers with animals due to limited movement. In short, the law basically expropriates land from farmers because of the large quantity of rivers, especially in the eastern part of the country. Since said properties would become part of the municipality, this law would give the mayor excessive power because s/he may then repossess lands within 50 meters of rivers/lagoons, particularly from people who s/he does not like. This is also bad for farmers because the cows need access to the river to drink, especially in the dry season.
2. Water Law.[11]
3. Environmental Law. This was already passed and will go into effect on 5/20/2006. This law deals with waste (trash) and air pollution, among other forms of pollution, and details penalties and fines associated with these laws. CONAGAN seemed surprised that the actual law included details on severe punishment for non-compliance.

CAFTA

Overall verdict: positive

CONAGAN generally sees CAFTA positively. In their view, it will open the door to a flood of new imports into Nicaragua. They believe that few of these imports will be in direct competition to local producers, but will allow Nicaraguan industry to have cheaper inputs. For example, the U.S. mainly produces yellow corn, while Nicaragua mainly produces white corn. Yellow corn will probably not take over the consumer market in Nicaragua, because most families are unfamiliar with it. However, cattlemen can use it as a cheap feed, and one that is quite effective at fattening their animals.

However, CONAGAN is worried about its producers' capacity and competitiveness. They negotiated the increase of quotas related to CAFTA, and are proud of this accomplishment. They feel more projects to increase production and enhance quality are necessary to effectively tap the most demanding market in the world (i.e. the U.S.). MAGFOR has done very little to date to build farmer capacity and create a conductive investment and production environment for farmers – something must be done to change this.

CONAGAN also expressed concern about U.S. farm subsidies and Nicaraguan producers' ability to compete, given that constraint. However, it is worth noting that rather than pressuring the US to eliminate subsidies, they believe the Nicaraguan government should provide more incentives for its producers to invest in their farms and production.

[11] Mr. Lovo and Mr. Blandón did not describe the Water Law in detail. However, it is noteworthy that this proposed legislation is written to facilitate water privatization, specifically in areas previously protected from private ownership.

Infrastructure is one of the major constraints faced by Nicaraguan farmers. They are very close to the U.S. market, yet despite a preferential trade agreement, CONAGAN has calculated that it is still cheaper for the U.S. to import meat from Australia than from Nicaragua because of transportation costs and infrastructure issues. Nicaraguan cattle often lose up to 15% of their usable meat weight in transit due to injuries sustained from poor-quality roads. Many members have difficulties even arriving at their farms in the rainy season, especially in the East, due to completely impassable roads. This puts Nicaraguan at a comparative disadvantage to U.S. producers, who benefit from excellent roads and access to their lands.

What needs to be done to make CAFTA work?

The Sandinistas put Nicaragua back 50 years and took a number of peoples' lands. Violeta de Chamorro made good strides with the IMF and World Bank on disarming and reconciliation. Farmers, who had quit producing under the Sandinistas, started producing again under President de Chamorro. Under the subsequent Alemán administration, production further increased. However, there is still much work to do to bring production up to its previous levels. For example, when the Sandinistas first took control, Nicaragua had 3500 cooperatives; currently, there are only 400. Current government does not support incentives for producers at all. CONAGAN officials expressed concern that the Sandinistas may win again in this year's elections, causing another backslide in Nicaragua's agricultural industry.

The government needs to recognize that the growth sector in Nicaragua is the agricultural sector. As is, the current president has stated that no country every got rich on agriculture, and has made comments supporting industrial and máquila type development over agriculture, claiming, "a man in the country with a machete is only worth as much as the machete, while a factory worker is worth X per day," which is blatantly insulting to the integrity of the agricultural industry and underestimates is great importance to Nicaragua's growth and economy.

<u>Challenges to the meat sector</u>

Access to credit

Mr. Lovo and Mr. Blandón expressed that the Nicaraguan meat sector faces serious challenges, to both producers and processors. Specifically, they mentioned farmers' need for access to credit. Nicaraguan farmers face much higher interest rates than do farmers in neighboring countries. For instance, loans in El Salvador usually come with interest rates of 5-6%, but similar Nicaraguan loans carry rates of 15%. Thus, during times of financial hardship, Nicaraguan farmers find themselves forced to sell cattle that are young or underweight (due to the dry season), rather than using credit to wait until the cows will bring in higher prices.

Meat processors also face difficulties from farmers' lack of available credit, as it has driven up the price of their inputs. Cattle prices have recently risen from 15 córdobas (about US$0.87) to 20-22 córdobas (about US$1.16 - $1.28) per kilo. Meanwhile, processors face ever-increasing barriers to markets through food safety standards, and that constant investment is needed to continue to meet SPS regulations. Mr. Lovo stated that "we need to produce not only volumes, but also quality."

Finally, farmers' inability to borrow at low rates hurts the national economy as a whole. When live animals are exported, Nicaragua loses the value added from the processing phase. CONAGAN sees this trend benefiting Mexico, Guatemala, El Salvador, and Honduras at the expense of their own country. They stated that involvement in value added processes is needed for better income generation.

Market structure

CONAGAN sees farmers' current reliance on intermediaries as extremely detrimental to the sector. Most cattle are raised far from slaughterhouses. Thus, a series of intermediaries usually buy and sell the cattle on their route from the farm to the market. Because of this situation, farmers earn a very small amount of what slaughterhouses pay for an animal. They are left with just enough earnings to keep their cattle alive, but not enough to be able to invest in better feed crops, genetics, or other crucial improvements.

Food safety and public health

Mr. Lovo and Mr. Blandón stated that attention was needed to address food safety problems present in both the domestic and export markets. Specifically, they expressed concern at the quantity of raw milk consumed, as it is usually less expensive than the safer, pasteurized alternatives. As more expensive, industrially-produced milk has occupied an ever-larger portion of the market, milk consumption has dramatically declined, from an average of 120 liters per person per year (in 1970) to 26 liters of milk per person per year (currently).

A similar situation can be observed in the meat market, resulting in consumption of inexpensive, illegally-processed beef, which has no food safety guarantees whatsoever. In order to make a trip to Managua practical, farmers need a full truck (15 cows). This is often a difficult task, especially in remote areas or during the dry season, and it often requires the cooperation of several farmers. When such a task is impossible, cows are slaughtered locally, through clandestine operations. Moreover, clandestine facilities often process stolen cattle. Thus, they pose a legal as well as health threat to the public. CONAGAN has an agreement with local police departments to combat these operations, paying off-duty officers to provide extra security. However, they feel that a mechanism is needed to help authorities easily trace a cow's ownership chain from farm to market.

In their opinion, municipal slaughterhouses also pose threats to overall food safety, though much less severely than clandestine operations. Although CONAGAN knows that current law prohibits municipal slaughterhouses from processing prime cows, that legislation is never enforced. Public slaughterhouses employ *fieles de rastro* to examine animals to make sure sick cows do not arrive, but MAGFOR has little to do with these facilities.[12] Thus, there is limited food safety oversight. However, Mr. Lovo and Mr. Blandón expressed that the greatest challenge faced by municipal slaughterhouses is the export of live cattle. They stated that if this

[12] It is noteworthy that in our subsequent meetings with municipal slaughterhouse employees, we discovered that this is not the case. A *fiel de rastro* does not usually inspect animals, but works mainly with legal and/or financial aspects of slaughterhouse operations.

problem is not addressed, these slaughterhouses will soon have to close because there will not be enough cattle left for local processors to slaughter.

Fiscal challenges

Currently, Nicaraguan farmers are less competitive in the international market every day. Taxes are currently very high in Nicaragua, the highest in all of Central America. Farmers are taxed at various points throughout the production and sale of their cattle, including municipal taxes on their farms, federal taxes, tax on the sale of cattle, and a 'guide' tax to move cattle. There currently are not incentives or opportunities for farmers to invest in expanding or improving their facilities. Politicians are too busy with corruption to defend agricultural producers. Easier access to credit would very much help this – currently, it is easier to get a car loan in Nicaragua than it is to get a loan for farm equipment, even though farm equipment is much more expensive and accessing such capital improvements is almost impossible without access to credit. Since farmers do not have access to credit and physical infrastructure is bad, they rely on intermediaries to get their products to market. Since producers have little negotiating power, intermediaries take home the majority of the profit in any given transaction, to the tune of 30-40%. This further demotivates farmers to invest and is bad financial for both the producer and the consumer.

Granada Municipal Slaughterhouse Meeting
10 March 2006, 9:00 AM
Interviewee: Jimmy Villareal

Arriving at the municipal slaughterhouse was an adventure in itself. We left the downtown (beautiful historical tourist) zone, passed through a working class zone, and continued through a squatter type area. The roads progressively deteriorated as we drove, more children were seen in the street, and it reeked of burning garbage. From there, we took a dirt road in horrible condition through a rather rural area for about 10 minutes until we finally arrived at what the taxi driver declared as the municipal slaughterhouse. Until then, everything had been rather filthy, with garbage and waste littering everywhere. However, the municipal slaughterhouse itself looked quite clean – there was no garbage or solid waste from the morning's kill anywhere to be seen.

At the entrance, we were met by a man with a 2-foot long axe who was the guard. We asked to meet with Dr. Carlos Espinoza, with whom we were to have our pre-arranged meeting. The guard kindly informed us that Dr. Espinoza would not arrive until 6 PM, when slaughtering starts, and redirected us to Mr. Villareal, who was in charge during the day shift. We explained that we were students studying Nicaragua's meat sector and that we had an appointment – Mr. Villareal was very willing to sit down and talk with us, despite having zero notice.

As we walked to the office, it was apparent that the facility was maintained, austere, and clean, although it certainly was not modern or new. We were taken to one small office with a rickety desk, three folding chairs, and two cardboard boxes that served as a filing cabinet.

Slaughterhouse staff

Mr. Villareal's role at the slaughterhouse is to monitor and ensure proper health and safety standards and to handle accounting issues. He is second in command to Dr. Espinoza, who we were supposed to meet with. Mr. Villareal had all of their financial and production reports on hand and was intimately aware of the slaughterhouse's particularities. Despite the humble surroundings, his knowledge and organization were impressive. Among the reports he had on hand was a report, co-sponsored by the Inter-American Development Bank, on a municipal growth and development plan for Granada.

Dr. Espinoza is a veterinarian who is in charge of visually inspecting each animal to ensure its health as it arrives at the slaughterhouse. Also, there is a *fiel de rastro*, who ensures that proper permits have been issued to slaughter the animal and that all necessary fees have been paid. His job is to ensure property rights, i.e. that none of the cows are stolen. While we do not know exactly how many working level employees there are, Mr. Villareal did comment that there is very low turnover and that the employees have 10-15 years of experience in their jobs.

Both Mr. Villareal and Dr. Espinoza report to Mr. William Martínez. Mr. Martínez works for the municipality of Granada and oversees the slaughterhouse, as well as public sanitation, trash, parks, gardens, and the market.

Challenges

Mr. Villareal started by explaining the challenges he currently faces. Their primary problem is funding. He noted that materials and assistance do come from the municipality when they are needed, although there is always a significant delay.

Production and general information

The municipal slaughterhouse provides a service to local vendors who wish to have their animals slaughtered for sale. They charge a set rate based on weight in pounds, which averages about 3,000 córdobas (about US$175) per day for all animals slaughtered. Last month, which he stated was an average month, 80,480 córdobas (US$4,665) were collected for their slaughtering services.

The slaughterhouse processes between 15 and 18 cattle per day, although there are about four days a month when no cattle are processed. The slaughterhouse also processes 30-40 pigs per day. Total production slightly increased in 2005, thus Mr. Villareal stated that he doesn't view the increase in production by industrial slaughterhouses as a threat to his operations.

Food safety and environment

Mr. Villareal stated that the Granada municipal slaughterhouse provides a better, safer opportunity for local vendors than clandestine methods. He stated that there is no damage done to the environment by taking the animals to the municipal slaughterhouse, compared with the large amounts of solid waste from animal carcasses that clandestine operators typically dispose

of in environmentally destructive and unsanitary ways. At the Granada municipal slaughterhouse, solid animal waste is picked up daily to be processed for feed.

Plans to expand and relationship with the municipality

The municipality has training sessions for slaughterhouse employees at least once a year. There are also plans to expand and update the facility this year, such that individual cubicles will be made for each employee to slaughter an animal. This will reduce the contact among animals in the slaughter process, thus reducing the probability of cross-contamination.

The municipality is very attentive right now to ensure that no solid waste enter the grease trap. They will also be updating their liquid waste filter, so that the water that exits the plant will be "clean enough to water your lawn."

Another future project, although probably not this year, is a methane gas digester. This addition could eventually make the plant completely self-sufficient in its energy use.

Relationship with municipal and federal government

The Ministry of Health (MINSA) has inspected the facility 3 or 4 times that Mr. Villareal can recall. MINSA does not have a very positive relationship with the municipal slaughterhouse because they do not provide training, but rather come to look for reasons to fine them. Mr. Villareal would like to see MINSA more involved in improving the slaughterhouse's human capacity.

The slaughterhouse has a much better relationship with the municipality, which has five inspectors that cover the entire department (or state). These inspectors work with Mr. Villareal closely because he is in charge of taking care of the slaughterhouse's food safety concerns during the day. The municipality offers seminars at least once a year and Mr. Martínez conducts feasibility studies for potential future upgrades, such as the filter example.

Clandestine operations

Mr. Villareal has accompanied the municipal inspectors before to investigate clandestine operators. He said that as far as he knows in Granada, there are no clandestine cow slaughtering operations, although clandestine pig operations do exist.

Proposed privatization

Mr. Martínez oversaw a feasibility study for privatizing the slaughterhouse or subcontracting the management. The previous mayor was adamantly opposed to the idea, but a new mayor was elected last year and he is considering the proposal. The study is a part of a greater development plan involving a new landfill and a new market. The Mexican company that would manage the landfill is eager for a decision, thus Mr. Villareal believes a decision will be made on privatizing the slaughterhouse this year.

When asked for his personal opinion, Mr. Villareal stated that he believes that privatization is a good idea because it will allow their finances to be independent from the overall municipal budget. Currently, the municipality is free to take money from the slaughterhouse's finances for other expenses, to be replenished at an undetermined future date. Thus, the slaughterhouse often cannot immediately get what it needs due to lack of funds. He thinks privatization will also cut back on undue bureaucratic processes. Currently, non-operating improvements and expenses are subject to a long review process, by which a series of seven different officials need to review and approve the proposal. Once a proposal is finally approved, it is then forwarded to the accountant, who may or may not have funding. In short, the municipal slaughterhouse will benefit from streamlined processes, more predictable finances, and increased independence by privatization. Mr. Villareal did not mention any reservations about privatizing the slaughterhouse.

Nova Terra (Industrial Slaughterhouse) Meeting
11 March 2006, 10:00 AM
Interviewees: Erick Matus, Giaconda Matus J., Noelia Sáenz

Erick Matus is the plant's production manager. He started on 01 Dec 2005, just 5 days before the plant opened. Previously, he and Nova Terra's general manager, Dr. Onel Pérez, had worked at Nuevo Carnic. Giaconda Matus (no relation) is Nova Terra's HACCP manager, who participated in the latter part of this meeting.

Background / Production

Nova Terra began business on 06 Dec 2005, so it has only been in business for three months. Currently, they are processing 60 cattle per day, which is about 1/3 of their slaughter capacity of 200 cattle per day. Nova Terra has a total of 250 employees. Nova Terra expects to get to their maximum capacity production within 2 months, yet only anticipates they will need an additional 5-10% increase in their workforce to achieve this capacity, absorbing most of the new needs through greater training. Nova Terra has all new buildings and equipment, and was launched from scratch over the course of two years.

Food Safety

Although Nova Terra has only been operating for 3 months, they have been approved for export to Panama, Guatemala, and the United States. Soon, they hope to complete the certification processes for Mexico and the rest of Central America, as well as the papers for Taiwan and Japan, which accept U.S. inspection. According to Ms. Matus, it took about two months to create and implement their HACCP plan. In a conversation later in the day with Ms. Sáenz, we were told that Nova Terra has entertained potential investors from Russia and Asia, and they expect to have trade with them yet this year.

Nova Terra has five employees in its HACCP department: Ms. Matus, three inspectors, and one lab technician. The HACCP department is dedicated solely to ensuring the food safety standards of Nova Terra's products. MAGFOR also has 5-6 inspectors permanently located at Nova Terra

to inspect animal welfare and animal health. In addition, USDA inspects their food safety process (and MAGFOR's inspection process) annually. Finally, on top of Nova Terra's HACCP staff, it has a food safety commission consisting of more than six of its highest level management staff. This commission works with and oversees the HACCP team to ensure the highest level of food safety is used at Nova Terra, and to reinforce the importance of HACCP as a company value.

The integrity of Nova Terra's food safety standards is reflected in its certification for export to the United States. Typically, FSIS inspectors do an initial inspection and give companies a list of items to correct or change before a second, final inspection. However, Nova Terra passed on the first visit, with absolutely no repair or processes to be fixed in their plant.

Products and Markets

Nova Terra currently produces 80% for the export market and 20% for the domestic market. As they grow, Nova Terra anticipates an increased percentage of production for the export market. The domestic market is small, such that only one industrial meat processing plant produces exclusively for that market (PROINCASA). Regarding domestic sales, Mr. Matus said the market was saturated and that "there is more supply than demand."

Mr. Matus also mentioned that while at Nuevo Carnic, he worked with CLUSA in developing the organic meat sector. He had a very positive impression of the relationship formed during that time, saying "they take their work very seriously in CLUSA." He has not worked with that organization in his current position, but he would welcome the opportunity.

Currently, Nova Terra sells ground beef and industrial cuts in bulk by the box to wholesalers, supermarkets, distributors, and hotels. Nova Terra expressed an interest in expanding their product lines to other cuts in order to better cater to the international market and increase value added. They are interested in the international market because it presents better opportunities due to its large size and better prices. Such an expanded variety of cuts would include steaks, hamburger patties, ready-to-eat products, and snacks. Such an expansion would require considerable research and investment in equipment and production practices. However, Nova Terra feels this will be a good future investment.

Suppliers

Nova Terra gets its cattle supply primarily from the North and Central parts of Nicaragua, as the Pacific region is very dry and the East coast is far. They obtain their cattle both directly from farmers, as well as from intermediaries. Nova Terra gets 60% of its cattle from individual farmers and only 40% from intermediaries. Forming direct relationships with farmers allows Nova Terra to know exactly where their cattle come from much better than other industrial meat processors. This also enables Nova Terra and the farmers that supply them to take home a greater percentage of earnings, considering there are fewer intermediaries.

CAFTA

From both a macro (country-wide) and business perspective, Nova Terra sees CAFTA as low risk to their company and to the beef industry. Mr. Matus observed that Nicaragua has been exporting beef to the U.S. for 50 years and is a net meat exporter. Thus, CAFTA represents an opportunity for the meat industry to increase its export to the U.S. due to an increase in the U.S. quota. As the quota is eliminated, this will allow the industry to increase production in the future. In order to best take advantage of this, Nova Terra thinks it is important to expand their product lines to more American cuts, such as the T-bone steak. In short, he said, "I see no risks."

Challenges

Nova Terra identified a few major, overarching challenges that the industry faces. The first is infrastructure, both technological and physical. Technologically, Nicaragua needs to focus on more value-added products, thus it needs to invest in enhanced equipment. A bigger challenge exists related to physical infrastructure, as improving roads and increasing access to rural areas is crucial. Current roads are generally in disrepair, resulting in long travel times for animals to reach processors. Moreover, since the roads are in such bad shape, animals often are injured when they arrive at the slaughterhouse. This results in a direct economic loss because the bruised and injured parts of the animal must be cut off and thrown away. Also, the roads further deteriorate with the winter rains, causing seasonal access problems (postponing all deliveries from a given region until the dry season) and worsened road conditions for the next summer, if left in a state of disrepair.

As we left Nova Terra, we shared a taxi with Noelia Sáenz, who is in charge of Nova Terra's export logistics. Ms. Sáenz commented that one additional challenge faced in Nicaragua's meat sector is the problem of live cattle being exported to Honduras and El Salvador. This occurrence effectively eliminates Nicaragua's ability to add value to the product, thus taking business away from the Nicaraguan meat industry. The exportation of live animals is also bad for the Nicaraguan industry because it increases the price of slaughter-age cattle, due to increased scarcity. To support this claim, Ms. Sáenz told us that the day before USDA arrived to conduct Nova Terra's export certification inspection, they were not able to have any cattle for the inspection itself from lack of supply, and the owner himself sought out individual farmers to buy their cattle at an exorbitant price for slaughter the next day. Also, she said that Nova Terra has a shipment to send to the U.S. on March 18, and she does not know if they will be able to fill the shipment due to supply problems. Currently, she said the meat processors in Nicaragua are working together to negotiate prices and try to retain more cattle locally. However, the general sentiment is that the government needs to do something to address dwindling cattle supply, especially considering increased demand from CAFTA.

A final challenge that Ms. Sáenz identified deals with threats to infrastructure. Specifically, she said that just yesterday, their plant nearly burned down because people had been burning trash on nearby properties and the fire caught, since it is dry season. She called the firefighters, but they took too long in arriving, such that she and the other employees went outside and were beating the fire out with brooms. As we have traveled throughout Nicaragua, our team has seen countless people burning their garbage on very dry yards and roadsides. Such fires present a

large threat to business facilities, as well as health and environmental problems from the resulting degraded air quality.

Environmental Issues

Nova Terra's facility and crematory for processing and disposing of solid waste is not fully functional yet, due to the plant's recent opening. In the mean time, while Nova Terra finishes installing its facilities, it is sending all of its solid waste daily to PROINCASA slaughterhouse, which is about 15 kilometers away in Tipitapa.

Matadero Central, S.A. (MACESA – Industrial Slaughterhouse) Meeting
13 March 2006, 10:00 AM
Interviewee: Nicolle Auffret

Background / Personnel

MACESA opened under its current ownership in 2001. Previously, it was closed in 2000 for one year during restructuring and change of management. About one half of the staff prior to 2000 was retained by the current MACESA management.

Ms. Auffret is the HACCP team manager for MACESA. She has been in her position for three years. MACESA's HACCP team consists of 11 employees, including Ms. Auffret, her assistant, 7 lab technicians, and 2 inspectors. There are also 6 MAGFOR inspectors.

Production

MACESA currently processes an average of 250 cattle per day, despite capacity of 380 cattle per day. Their production figures depend on seasonal and market conditions, and can increase as high as capacity permits, and go as low as 150 cattle per day. Ms. Auffret noted that in high season, they sometimes produce beyond capacity to 400 cattle per day, which justifies their current plans to expand. MACESA's plant currently has three chillers, although the expansion would accommodate a fourth chiller, increasing capacity to 450 cattle per day.

The export market constitutes 85-90% of current production, while the domestic market represents the remaining 10-15% of their production. They produce mostly industrial cuts for the United States, which is their largest market. The United States' trade importance is enhanced by the fact that industrial cuts represent the majority of usable meat from a cow. The United States is their only client that purchases industrial cuts, further underlining MACESA's reliance on the U.S. market. MACESA also produces a smaller proportion of select cuts for Mexico, El Salvador, Honduras, Puerto Rico, Panama, and Guatemala. Finally, they export viscera to Japan and Taiwan. Management focuses almost exclusively on developing the export market rather than the domestic market due to the impressive difference in prices that can be obtained for their product. MACESA is very proud to state that it has never had a container rejected upon arrival to the destination country – they noted that this has happened with other processors.

MACESA is an environmental leader in the Nicaraguan meat industry. Ms. Auffret claims they are the only Nicaraguan meat processors that comply with environmental Law 3395. MACESA also has very stringent waste disposal procedures, in which their solid waste is ground and cooked for feed. Their liquid waste passes through a grease separator and a high-tech filter so that the remaining water is clean. Finally, blood is boiled and turned into an environmentally-friendly powder.

Supply Chain

MACESA purchases its cattle for slaughter solely from intermediaries. In almost all cases, there are 3 intermediaries between the farmer and the plant: *acopiadores*, *colectores*, and *comerciantes*. Ms. Auffret described this system as advantageous for her and the plant, as the intermediaries classify the grade of the cattle before they arrive at the plant, thus eliminating the need for the plant to weed out substandard cattle. She notes this is far preferable than the systems based on weight only. Also of note, MACESA has close personal relationships with the intermediaries with which it works, which creates trust in their classifications and helps MACESA to get products during times of scarcity.

MACESA is located Juigalpa, which in a rural area 2 hours east of Managua. This location allows them to be geographically closer to producers, which results them paying a lower price than producers in Managua pay for cattle. This price differential can vary between 25 centavos (US$0.014) and 1 córdoba (US$0.058) per kilo. Their location is also advantageous because since the cattle have to travel shorter distances to the slaughterhouse, they suffer fewer transportation-related injuries, thus resulting in a higher quantity of usable meat.

Although MACESA is located farther from Managua than other processors, it does not see its location as presenting a cost disadvantage in access to international markets. They send their export product by either boat or land, depending on the country. MACESA's domestic market product is sold primarily to supermarkets (La Colonia) and wholesalers.

Municipal and clandestine slaughterhouses

Ms. Auffret stated that municipal slaughterhouses kill both substandard cattle and industrial-quality cattle. She stated that they can legally do this, even though our team knows that they cannot, based on Law 158. She also identified two important safeguards at municipal slaughterhouses: the occasional MAGFOR health inspections and the registry that they keep of who is locally licensed to slaughter at the municipal slaughterhouses. However, Ms. Auffret noted that she thought it was not in the municipal slaughterhouses' financial interest to comply all the time, thus she suspects that they do not meet these two criteria when inspectors are not present. Ms. Auffret did not seem concerned about lack of compliance in municipal slaughterhouses, which we attribute largely to her comments on those establishments' exclusive link to the domestic market (compared with MACESA's nearly exclusive export market).

Ms. Auffret went on to state that the clandestine slaughterhouses do not pose a threat to their minimal domestic market, as she has learned through her studies that clandestine operations almost solely slaughter sub-standard cattle.

CAFTA

Ms. Auffret does not see CAFTA as an obstacle. On the contrary, she noted that, "we are a small plant with big opportunities." She noted that since MACESA has earned food safety prizes, is HACCP certified, and is widely recognized for high environmental standards, CAFTA can only offer opportunities for growth.

Since they have smaller capacity than other industrial slaughterhouses, Ms. Auffret noted a comparative disadvantage to the larger industrial slaughterhouses. However, she seemed confident that their expansion plans would put them on par with the largest industrial slaughterhouses, thus eliminating that threat.

Challenges

Ms. Auffret noted one large challenge related to MACESA's operation: supply. She was particularly concerned about the large number of live animals being exported to Guatemala and El Salvador, resulting in scarcity in Nicaragua. Moreover, she expressed concern that animal carcasses are being exported to other countries for value-added processing there, effectively giving up value-added for the Nicaraguan market. She realizes that it is possible for laws to be passed to address these issues, as it happened in the 1980s when calves were being slaughtered, resulting in heavy overharvesting and laws prohibiting such activities. In this case, she believes a law should be enacted to limit the export of live animals and animal carcasses, for the benefit of the Nicaraguan industry. Last year, slaughter-age cattle reached a record price, creating a strain on processors. The labor unions of the three largest slaughterhouses have come together to lobby for legislation to limit the export of live animals.

Ms. Auffret also noted a smaller challenge related to receiving already-bred cows. They have an inspector that attempts to identify and reject these cows, as they have excess weight. However, some still occasionally get through.

León Municipal Slaughterhouse Meeting
14 March 2006, 10:00 AM
Interviewees: Leonel Acuña (606-7869) and Carlos López (828-3737)

Leonel Acuña is the *fiel de rastro* at the León Municipal Slaughterhouse. He has only been in his position for two weeks. Carlos López is the general manager of the facility and has been in the position for a few years.

Production

The León Municipal Slaughterhouse currently slaughters 13-16 head of cattle per day, with 20/day as an absolute maximum. This is nowhere near capacity and represents a significant decline from two years ago, when they slaughtered 50-70 head of cattle per day. Since we are

currently in Lent and León is a very Catholic city (more so than in the rest of Nicaragua), Fridays see even lower processing because Catholics do not eat meat on Fridays in Lent.

Cattle production has two distinct seasons. High season is from June-December, with the absolute peak months being November and December. High season production was quoted as 650-700 head of cattle per month, or an average of 26-28/day. Low season corresponds directly with summer, and brings production down to 400-500 head per month, or an average of 16-20/day. The quality of cattle also dramatically decreases in the low season, as the only people who slaughter their animals do so out of dire financial need.

Clientele

The León municipal slaughterhouse never owns the cattle that are slaughtered there. Furthermore, they don't actually provide the service. Rather, they ensure the cattle's legality and provide a supervised venue for its clientele to slaughter the animals themselves. The León municipal slaughterhouse has 24 clients on its registry, only 18 of which slaughter animals regularly.

The facility charges clients 18 córdobas per pig (about US$1) and 120 córdobas per cow (about US$13). These charges are flat rates that are the same regardless of the animal's weight.

Food safety and oversight

When asked about food safety, Mr. Acuña stated, "There is not even one single sanitary control mechanism." There is no refrigeration or temperature control. They slaughter any legal (not stolen) animal that arrives at the slaughterhouse, regardless of age, weight, condition, or pregnancy. To drive home the point, Mr. Acuña stated that the other day, a calf was born in their lots to a cow that had been brought to them for slaughter. The problem of slaughtering cows in advanced stages of pregnancy is such that he said there is usually a pile of calf fetuses in the corner of the slaughterhouse, despite the existence of laws prohibiting the slaughter of bred cows. Enforcement of this law is the responsibility of the site's MAGFOR veterinarian, whose sole job is to inspect animals' condition prior to slaughter. Mr. Acuña noted that the MAGFOR inspector at their facility only shows up *after* the daily slaughter has been finished, taking a look at the carcasses and going home. This leads to what Mr. Acuña described as "totally indiscriminate" slaughter practices.

MINSA is also supposed to inspect the facility twice a week, although in the two weeks Mr. Acuña has been at the León municipal slaughterhouse, he has never once seen the MINSA inspector. This lack of inspection is especially troubling, considering there is a very low vaccination rate and the fact that preventative animal health measures are almost non-existent. Thus, the likelihood of sick cattle arriving and contaminating other cattle is quite high. Also, since all animals (both cattle and hogs) are slaughtered in the same large, "obsolete" room with rusty hooks and wood stump chopping blocks, they and their remains certainly come in contact with each other. We saw this facility and were shocked by its state of disrepair, and the fact that a barefoot man with a garden hose was "cleaning the area" with a wire brush and no cleaning chemicals that we could see or smell. Mr. Acuña stated that they have very limited financial

resources, such that even the purchase of basic cleaning supplies stretches their budget, which is about 100,000 córdobas (US$5,800) per year. This budget is actually *much* less than what they bring in at the slaughterhouse and Mr. Acuña said he has no idea what the municipality does with their earnings. Since they don't even have funds to purchase basic supplies, there is certainly no room in the budget for the long-overdue capital improvements – current facilities are "beyond their useful lives."

The municipality has 11 employees at the slaughterhouse. As the *fiel de rastro*, Mr. Acuña identified four primary tasks related to his job:

1) ***Supervising employees.*** He makes sure they are following procedures and completing tasks assigned.
2) ***Overseeing cattle logistics.*** He ensures they have the necessary papers and permits upon arrival at the plant. This must prove the last two owners of the cow, and is implemented to avoid the slaughter of stolen cattle. Mr. Acuña was recently hired to replace a corrupt *fiel de rastro*, who was accepting bribes from cattle thieves to look the other way when they brought stolen, undocumented cattle to the facility. Mr. Acuña has implemented measures in this process to best prevent the recurrence of processing stolen property. First, he established a good relationship with the local police, so he can check the papers he is given with and confirm their authenticity with what the municipality has on file. Second, he has implemented a process to review papers with corresponding cattle individually, rather than as a group. Finally, before his arrival, only the last owner was confirmed; focusing on the last two owners increases legitimacy and increases difficulty of falsifying documents.
3) ***Overseeing sanitation procedures.*** Mr. Acuña ensures the facility is clean, to the best of their ability, and that their solid waste is properly incinerated.
4) ***Administrative functions.*** Since the León municipal slaughterhouse has no funds for secretarial or bookkeeping staff, Mr. Acuña also prepares production and expense reports and oversees small purchases, such as cleaning supplies.

<u>Daily operations</u>

The daily schedule at the León municipal slaughterhouse is as follows:

9 AM – 12 noon: Cattle arrive

12 noon – 2 PM: Lunch break

2 PM – 5 PM: Employees sort the cattle and put them in pens

5 PM – 10 PM: Closed

10 PM – 2 AM: Animals are slaughtered and meat is cut. Slaughter is at night because since there is no refrigeration, this is the coolest time of the day and the meat will preserve better.

6 AM: Meat is released to its owner. All meat is taken directly to market for same-day sale, since there is no cold chain.

Obstacles

Mr. Acuña summed up the current state of the León municipal slaughterhouse as follows: "Here, we have absolutely nothing. Here, we work only by the will of God. I told the mayor that he may as well have sent me to Baghdad."

He went on to identify a number of obstacles, which are discussed in further detail below. These challenges include their relationship with the government, clandestine slaughter operations, threat from industrial producers, overharvesting, and lack of demand due to poverty.

Relationship with the government

The León municipal slaughterhouse solely receives funding from the Municipality of León. While the municipality gives them very little funding, Mr. Acuña commented that León receives no federal funding because their elected municipal government is not the same party that controls the Federal government. This political game shorts the municipality, thus creating a funding shortage that doesn't allow the municipal slaughterhouse to maintain its basic structure, much less comply with any food safety standards. Mr. Acuña only sees the funding shortages getting worse, as many roads washed out in the last rainy season, thus further straining the municipal governments minimal budget.

As for government inspection practices, Mr. Acuña felt they were better under the Sandinistas in the 1980s. While he recognized that the Sandinistas were unpopular in many aspects, he said food safety in public slaughterhouses was among their strengths. The current Bolaños Administration has no political will to improve the current situation, thus Mr. Acuña does not foresee any advances in the near future.

Clandestine slaughterhouse operations

Although clandestine cattle operations have existed in León in the past and do exist in other states, Mr. Acuña does not see it as a major, current threat in León. However, he did note in detail the extent of the local challenge with clandestine pork operations. He is confident this issue will be addressed, as a result of an alliance he has formed with MINSA, the local police, and the market superintendents.

Recently, the police broke up a large cattle theft gang in the area, which will hopefully decrease clandestine slaughter even more. However, to accentuate the problem of clandestine cattle slaughter and theft on a national level, Mr. Acuña commented that Daniel Núñez, the former head of CONAGAN, had 300 cattle stolen last year, yet was only able to get 34 back.

The only significant, non-slaughterhouse operations that occur in León are when a cow is too sick or weak to get to the municipal slaughterhouse. In this case, to avoid losing the cow before slaughter, the owner calls the police, which goes to make sure the cow really is not able to travel,

and then issues a one-time permit for on-site slaughter at the farm. This is the only legal way of slaughtering an animal outside of a slaughterhouse.

Threat from industrial producers

Mr. Acuña has seen a dramatic increase in industrial meat distributors in León. Their economies of scale make it very difficult for small, local meat suppliers to compete. This situation is exacerbated because most other municipalities have protectionist policies prohibiting the entry of meat from other municipalities. Thus, León has meat from all of Nicaragua in its markets, but its products do not have access to most other parts of Nicaragua. Mr. Acuña believes that the only way to address this problem is for the Municipality of León to forbid entry of meat from other municipalities, since they cannot force the other municipalities to accept their meat.

Finally, the industrial meat business is largely owned by politically well-connected families. Unless something dramatic changes, Mr. Acuña feels future policies will continue to favor industrial slaughterhouses over local vendors.

Overharvesting

Overharvesting cattle poses a serious threat to the Nicaraguan meat market and has two facets: export of live cattle and slaughter of young and pregnant cows. Slaughter of young and pregnant cattle is a result of poverty. Cattle owners need immediate, hard cash in times of economic hardship (i.e. a sick child) and cannot wait for their animal to reach its prime slaughter age. This results in an overall decrease of cattle stock in Nicaragua and scarcity. Another factor motivating farmers to slaughter pregnant cattle is the market for fetal calf blood, which is reportedly purchased for a whopping US$37 per liter by Bioprosa, an American company.

The next major reason for overharvesting cattle is the export of live cattle, especially to Mexico and El Salvador. A group of Mexican investors has bought land in León that it uses to fatten cattle and then sends them to Mexico for value-added production. Such practices are not only depleting available local sup-plies, but also removing the Nicaraguan market from the value-added process. Finally, the scarcity of cattle often results in daily losses to local meat vendors, who spend an entire day and gasoline driving from farm to farm, without finding any cattle to buy.

Lack of demand due to poverty

The final, basic challenge to the meat industry is poverty. Nicaraguans have traditionally been large consumers of meat. However, as prices rise more quickly than salaries and unemployment continues to be a problem, it is increasingly difficult for most Nicaraguan families to include meat in their diet.

Together, these five obstacles create a bleak outlook for the León municipal slaughterhouse and the meat vendors that they service. Mr. Acuña stated, “I believe the day is coming when we will cease to slaughter here.”

Chinandega Municipal Slaughterhouse Meeting
15 March 2006, 10:00 AM
Interviewee: Pedro Salinas

Background

Mr. Salinas is the general manager of the Chinandega municipal slaughterhouse and has been in the position for five years. His position is appointed by the mayor and he has now been appointed by two consecutive mayors. Mr. Salinas is an agricultural engineer by trade, and has worked in agriculture his whole career. He is forward-thinking and has implemented a number of plant- and capital-improvement projects since his arrival, which we will discuss in further detail throughout this summary.

Production

The Chinandega municipal slaughterhouse slaughters an average of 30 cattle per day and thirty-five hogs per day. There is a difference in the seasons, although not as significant as we've seen in other slaughterhouses. Regardless of season, Friday's represent the highest volume of cattle due to people buying meat for the weekend – about 40 head per day, to be specific. Sundays represent the slowest day of the week, with just an average of 28 head per day. Seasonally, December represents the highest production due to Christmas, averaging 35 head per day. The low season corresponds with Nicaragua's dry season, when only 26 to 27 cattle per day are slaughtered.

The Chinandega municipal slaughterhouse charges 80 córdobas (about US$4.65) per head of cattle and 25 córdobas (about US$1.45) per hog for the services it provides. Payment of these fees does not go through slaughterhouse personnel but rather is received at the municipality before arrival at the slaughterhouse. While the municipal slaughterhouse does not actually slaughter the animals, it des charge for the use of the facilities and equipment, pre- and post-mortem veterinary inspections, stables, and general operating costs. The actual slaughter is carried out by the meat vendors and their staff, as we saw also in the León municipal slaughterhouse. These vendors sometimes bring as many as 10 head per day.

The facility in Chinandega was a consolidated in the past five years to serve two other, nearby municipalities. This broadens their market and gives them more stability. Over the past five years, production in the Chinandega municipal slaughterhouse has remained steady due to this consolidation – without it, their production would have declined, as is the case in the majority of Nicaragua.

Mr. Salinas mentioned that although a law exists to protect cattle stocks and prohibit the slaughter of young and pregnant cattle, no one really enforces it at their facility or elsewhere.

Food Safety and Oversight

Since Mr. Salinas' arrival, there has been great improvement in food safety practices. They have implemented and enforced pre- and post-mortem sanitary and animal health inspections. There are two MAGFOR-certified, municipally-funded veterinarians who carry out these inspections every day (one veterinarian for cattle and one for hogs). MAGFOR itself comes to the site on an as-needed basis to resolve animal health-related disputes between the veterinarians and local vendors. Mr. Salinas holds high professional regard for the MAGFOR inspectors' knowledge and integrity.

MINSA also visits the municipal slaughterhouse for mandatory inspections every two weeks or so. Specifically, they inspect the slaughtering areas and ensure their safety.

The municipality employs 13 permanent staff at the slaughterhouse. Among these is the *fiel de rastro*, who ensures each animal has all necessary legal papers, supervises the nightly slaughter employees, and punishes those who don't comply with facility rules. There are also 17 or 18 vendors who regularly slaughter at the facility. They and their employees represent an additional 100 workers.

Most of the municipal and vendor employees have attended several training sessions that Mr. Salinas has organized. These sessions deal with handling practices, animal health, and other sanitary concerns. Most of these sessions are given by staff from the University of León, although Mr. Salinas would like to collaborate more with industrial slaughterhouses on training programs. On top of training for employees, Mr. Salinas has launched public awareness campaigns, mostly through the radio. Through this, the public is informed of safe meat storage procedures, as well as how to select safe meat. The Chinandega municipal slaughterhouse and industrial plants all stamp every cut of inspected meat, representing its origin and safety.

Mr. Salinas describes their current production as "semi-rustic." There is no refrigeration and cattle are cut up and processed on the slaughterhouse floor. There are hooks for certain cuts, but not for the entire animal. This year, they plan to install equipment to hoist the entire cow and metal tables for processing the cuts, thus eliminating the existence of processing on the floor and greatly improving food safety. The municipality has already approved this plan. Regarding the actual slaughter process, the Chinandega municipal slaughterhouse recently upgraded to a slaughtering pistol, which allows them to instantly kill the animal and then systematically drain its blood. This is a considerable improvement over the old method, which involved chopping the animal's head of with an old, rusty guillotine.

The entire slaughter area is cleaned daily after the slaughter is finished. All floors, walls, and equipment are cleaned thoroughly with water, bleach, and soap. Currently, their incinerator is out of service, so they bury the solid waste behind the facility. Thus, one of Mr. Salinas' primary goals for this year is to secure funding to rehabilitate the crematory. As for liquid waste, the Chinandega municipal slaughterhouse has a bio-digester using anaerobic bacteria to process this waste, which is converted into gas and use for the plant's energy. This presents great environmental strides, as it not only reuses and recycles waste, but also has eliminated the use of firewood to heat water at the facility. Moreover, it eliminates the considerable expense of

firewood, freeing up financial resources for other projects. The bio-digester produces so much gas that the slaughterhouse has leftovers that it pumps to the nearby municipal jail. The bio-digesters were originally installed by a grant from JICA before Mr. Salinas' arrival. The previous management allowed it to fall into disrepair, but Mr. Salinas spearheaded its revival and got funding from the Austrian Embassy to do so, to the tune of US$11,000. The municipality has an office dedicated solely to international relations, which researches and identifies potential donors and funders. It also applies for grants for improvement projects outside the means of the municipal budget. The municipality currently allots 800,000 córdobas (more than US$46,000) to the operating costs and salaries of the people at the municipal slaughterhouse.

Obstacles and Responses

We asked Mr. Salinas about the obstacles faced both by his facility and by the meat sector in general. The three overarching areas discussed included clandestine operations, industrial products, and scarcity.

Clandestine operations in Chinandega have reportedly diminished greatly over the past several years. The local clandestine operations that exist are primarily in pork processing. He attributes the decreased prevalence in Chinandega to better collaboration with the police, MINSA and MAGFOR, training to municipal employees in 13 sub-municipalities on legal requirements, the addition of the farms' brands to the application form, and his consumer outreach programs. Because of these precautions, Mr. Salinas said that it is hard for clandestinely-processed products to enter market channels. Rather, it is sold directly from the homes of clandestine operators or on the street.

The prevalence of industrial meat in the market poses little threat to the municipal slaughterhouse's vendors, according to Mr. Salinas. Rather, he stated that the meat market in Chinandega is growing, such that industrial product volume is increasing and local product volume is remaining the same. Mr. Salinas was unsure of the cause of the market growth.

Finally, the shortage of cattle seemed to be the most serious threat discussed because it increases costs to local vendors, thus also increasing the market price. Beef is valued at 20-25 córdobas per pound (about US$1.15 to $1.45), which represents an increase on past Nicaraguan prices, but is still less than in the rest of the region, especially considering its high quality. Mr. Salinas stated that the scarcity is caused in part by the export of live cattle and unprocessed meat to Mexico, El Salvador, Honduras, and Guatemala. Scarcity is also caused by domestic overharvesting, including the slaughter of pregnant and young cows. This presents a challenge to local vendors, who often spend an entire day driving from farm to farm without finding cattle.

Of note, Mr. Salinas views the prevalence of cattle going to the north as an opportunity of for their slaughterhouse. He stated that many Salvadoran processors buy Nicaraguan cattle and have it slaughtered in Managua before transporting it to El Salvador for further processing. Since Chinandega is much closer geographically to El Salvador than is Managua, Mr. Salinas hopes to reach out to these processors to market the services the Chinandega municipal slaughterhouse offers. He noted this could be of great financial benefit to Salvadoran processors, as they often

slaughter 70 cattle per day, and transport for such a large amount would be considerably less from Chinandega than from Managua.

Despite the challenges, Mr. Salinas also sees a macro-level opportunity for the industrial meat processors to expand into organic products. Nicaraguan farmers use very few chemicals and are well-known for meat quality, which together represents a strong market opportunity.

Notes

This facility was much better maintained than the León municipal slaughterhouse, despite its relatively old infrastructure. The offices had necessary equipment (a typewriter, filing cabinets, real chairs, and fans) and the corresponding secretarial staff. The high level of maintenance and sanitation was apparent not only in the office, but in the slaughter rooms. The worker cleaning the slaughter facilities had on appropriate, rubber work boots, and was using two cleansers, compared with the worker in León who had no cleansers and no shoes. Also, Chinandega has two completely separate killing and processing areas for beef and port, which is *very* important in preventing cross-contamination among different species. The municipal slaughterhouse in León used one room for all animals. Also, the Chinandega municipal slaughterhouse had specific employees dedicated to overseeing and maintaining their bio-digester, to avoid malfunctions.

Masaya Municipal Slaughterhouse Meeting
16 March 2006, 9:00 AM
Interviewees: Carlos Martínez (general manager, Masaya municipal slaughterhouse)**, Hermán Henríquez Gaitán** (cattle processor)**, Arnoldo Solórzano Reyes** (cattle processor)**, Maritza Añamendi Martínez** (pork processor)**, Edwina de los Ángeles** (pork processor)**, Adán León Caldera** (veterinarian, Masaya municipal slaughterhouse)

We arrived at the Masaya municipal slaughterhouse, hoping to meet with their general manager or anyone who would take the time to talk to us. As we entered, we were pleasantly surprised by its upkeep – there was a security guard who let us in and two workers tending to the grounds. There was landscaping (fruit trees, hibiscus bushes) and the walls and building were all quite well painted. We were met by a secretary at a computer in an air conditioned office – this is the first computer or air conditioning we have seen at any municipal slaughterhouse on this trip. We were taken back to Mr. Martínez's office, which was also air conditioned, and very professional. He had a number of chairs set up and as we started to interview him, he asked us to wait because others were coming. As it turned out, we had an impromptu-focus group on our hands because he had invited several processors who slaughter animals at the facility to participate, as well as the municipal slaughterhouse's veterinarian. Another secretary came in and offered us all ice-cold Coca-Colas. This facility was definitely different from the others.

Focus group members

Mr. Martínez began working at the slaughterhouse in 2005, when a new local government took power. His total time in this position is just over 1 year. This is a politically appointed position.

Ms. Añamendi has worked in pork processing her entire life, inheriting the trade from her mother. She has been in charge of the trade for 35 years.
Mr. Henríquez has been in the cattle business since 1984, so he has 22 years experience working with cattle. He started at a small slaughterhouse far from the current one and worked his way up.
Mr. Solórzano has worked as a meat processor for 35 years.
Ms. De los Ángeles has worked as a pork processor her whole life, much like Ms. Añamendi.

Background

The Masaya municipal slaughterhouse was founded in 1989. It does not slaughter animals, but rather offers the venue for processors to slaughter their animals. This slaughterhouse serves Masaya and the surrounding area. They supplement their income with the sale of bananas, avocados, and mangoes grown on the property.

The slaughterhouse is a sustainable cost center. It does not give the money it takes in to the municipality, nor does it receive funding from the municipality. Funds pay for daily upkeep, repairs, and 15,000 córdobas (US$870) per month for a loan that Mr. Martínez had to take out upon arrival to make capital repairs. They have also budgeted to make more capital improvements with the left over funding in their budget, including an improved unloading zone for pigs, replacement of the cement killing floors, an additional 6 pig stalls, improvement the electrical system, an additional four lights to the property, and exterior paint for the slaughterhouse building itself.

They slaughterhouse's 2004 budget was about 700,000 córdobas (US$40,580) and their 2005 budget was 1,119,820 córdobas (US$64,917). Their 2006 income is projected at 1,690,700 córdobas (US$98,011) and 2006 expenses are projected at 1,580,777 córdobas (US$91,639), leaving a cushion for capital improvements, assuming income continues at the projected rate. The prior municipal administration was laundering funds.

Production

Until recently, the Masaya municipal slaughterhouse charged 30 córdobas (about US$1.73) per hog and 80 córdobas (about US$4.63) per cow, regardless of weight. Two weeks ago, the prices increased to 35 córdobas (about US$2.03) per hog and 90 córdobas (about US$5.22) per cow. This increase accounts for increase in daily expense costs, as well as pay raises for the cleaning staff, whose salary went from 900 córdobas (US$52) per month to 1,200-1,300 (US$70-75) per month (depending on the individual).

Pigs
The Masaya municipal slaughterhouse facilitates the processing of approximately 60 pigs per day. November-December are the peak months, when production increases about 30 percent due to the holidays. The pork market in Masaya is growing. Production has increased in the pork market and prices have increased, although not in a debilitating way as the cattle market has experienced. Rather, prices have increased proportionate to the rate of inflation.

Like beef, pork has also seen an increase in exports, although the pork processors said it is being processed before being sent, thus leaving the value-added part of the production chain in Nicaragua.

Cattle

The facility slaughters 150 cattle per week. November-December are the peak months, when production increases about 30 percent due to the holidays. Their low season corresponds with the dry season in Nicaragua.

Production in the local meat market has decreased substantially because of the export of live animals and the associated high cattle prices. Mr. Henríquez noted that five years ago, the largest individual processor could produce 80 in one day – now the 6 processors together cannot process that many because of the market conditions. Cattle has gotten much more expensive for meat processors to buy, yet they cannot increase the prices because the consumers will just stop buying meat. Quality of cattle has also decreased because the cost of electricity has increased, making it less feasible for farmers to water their crops and pastures, resulting in lower quality feed and fodder for the cattle, resulting in lower quality animals.

Processors bring all kinds of cattle to slaughter. However, they said they never consciously bring pregnant cattle for slaughter.

There are separate slaughter facilities for cows and pigs. All artisan employees arrive at about 9 PM to start the slaughter shift, which is done during the cooler overnight hours. They use firewood to heat water.

Stakeholders

The Masaya municipal slaughterhouse has 23 vendors of pork that regularly slaughter there and 6 vendors of meat. Each vendor has its own staff to slaughter the cattle. There are 13 municipal employees that work at the facility: 3 administrative staff, 1 receptionist, 1 veterinarian, 2 guards, 1 supervisor, and 5 cleaning staff. There is no *fiel de rastro,* so Mr. Martínez carries out the responsibilities typically affiliated with this position.

Food safety

Hygiene is Mr. Martínez's top priority. He demands great care in sanitary issues, and noted that his workers must have proper uniforms and boots, which comes at a financial expense. Mr. Martínez sends memos to processors outlining safe carcass handling and recommending training.

MINSA carried out an inspection 25 days ago, in which the facility got a food safety score of 75/100. Mr. Martínez was very proud of this score, noting that any score over 60 is passing. MINSA looked at the facilities physical structures, both inside the slaughterhouse and on the grounds.

The municipal slaughterhouse's veterinarian inspects animals, both before and after slaughter, for general health and sicknesses. He has almost no disputes with processors on animal health

violations, as they respect his professionalism and he recognizes that they are well-informed on the standards.

They use two cleaning chemicals to sanitize the slaughterhouse. Bleach is applied to the entire facility, including the walls, once a week. Criolina is used daily. The slaughterhouse is also fumigated approximately once a month to kill any flies, mosquitoes, rats, mice, bugs, and other pests that may be tempted to move in. MINSA pays for the fumigation once every 3 months, and the slaughterhouse pays for the service the other two months out of their own budget. They also regularly clean the drainage pipes that carry liquid waste away from the slaughtering facilities.

Environmental issues

The Masaya municipal slaughterhouse does not have functioning on-site facilities to process their solid waste. They currently send their solid waste to an off-site organic soap factory for reuse. Of note, the facility does have a bio-digester that the Dutch installed many years ago, but the last administration did not maintain it properly and it hasn't been in working order for 7 years. Mr. Martínez is looking into the possibility of rehabilitating the bio-digester with the municipality's office of special projects, which is looking for a $20,000 donation to fund the project.

With respect to environmental safety, MINSA inspects the water once a week. They also come unannounced for immediate inspections, to check compliance. MAGFOR comes once a month to obtain information about the cattle processed there.

Clandestine operations

Clandestine operations are not perceived to be a problem in Masaya, as the processors at the market all know each other and know they are legitimate. Mr. Martínez pointed out that the clandestine operators do not bother going to market, and that they do exist, although he agreed that it is not a real issue in Masaya due to better police oversight. The perception is that clandestine operations present the most significant problem in Managua.

Challenges

Capacity building – Ms. Añamendi wants look into forming a cooperative, since she sees the local processors as stronger as a whole than individuals. She and the others welcomed the idea of a cooperative that would include both cattle and pork. She said, "Even though we are competing against big companies, they were small once too. If they grew, so can we." This can help them in the current market situation and gain better economies of scale. In order to do this, she notes that they would need access to training, seed capital, and/or loans. However, she noted that such a concept is not a stretch since the processors completely fund the slaughterhouses' current operations. She further reiterated that they must work together to survive, and together, she is certain they can.

Credit – they need help getting proper access to credit. They noted that the large industrial processors have no trouble getting a loan, while the small processors like them find it nearly

impossible to get a business loan. Even then, they have exorbitant interest rates. Ms. Añamendi stated that local pork is high quality and she would like to export, but without investment, that won't be possible.

Export of live animals – Mexican and Salvadoran investors from large corporations go to cattle auctions, buy in bulk, and ship the cattle to their countries by boat, leaving minimal supplies for local processors. Both pay in dollars, which also makes it hard for locals to compete. Mr. Henríquez expressed concern that with CAFTA, the US and other CAFTA countries will come to Nicaragua and do the same thing, driving prices up even more and leaving no animal stocks for the local processors and market. Both beef and pork processors feel strongly that the beef industry needs to follow the pork industry and keep the value-added process in Nicaragua. Beef processors stated that the sale of animals for live export often results in their inability to buy animals, as they maintain high quality standards and refuse to buy sub-standard cattle for processing.

CAFTA – processors are worried that products from other CAFTA countries (particularly the U.S.) will enter the market at a price just below theirs, thus forcing them to reduce their prices. Since they already have very small margins, this deeply concerns the processors. Mr. Solórzano stated, "I am not against free trade, but I do want norms and methods to protect local processors, as well." Ms. Añamendi stated that if they were to form a cooperative (or perhaps jointly owned slaughterhouse), they could more easily access bigger markets, and that they would be interested in exporting, given the opportunities that CAFTA presents.

Local consumption – prices increase faster than consumer incomes, thus resulting in decreased consumption of luxury food items, like beef. This greatly constrains processors, who know they cannot raise prices.

Industrial slaughterhouses – Members of the group felt this was one of the most difficult problems the beef processors face. PROINCASA sells in Masayan supermarkets at half the price of local processors. The perceived reason for this price is that PROINCASA is making its profits in the Managua market, which has comparably much more income. Thus, they can afford to sell at a very minimal profit or even breaking even in Masaya. Specifically, Mr. Solórzano noted that PROINCASA sells its product for 30-35 córdobas per pound in Masaya, yet sells the same product for 65 córdobas per pound in Managua. Meat processors reported that their production and sales have been cut in half since Proincasa's arrival to the Masaya market. Currently, the interviewees estimated that PROINCASA has 40% of the Masaya market for meat, and they believe it will only continue growing. They also claim that PROINCASA and San Martín are illegally selling fresh meat in Masaya. By local law, meat may be brought to a municipality frozen, but not fresh (or chilled). The processors described the allegedly illegal product as chilled or fresh, although when they described it to us, it truly sounded as if it were frozen and in which case, it is legal. The processors' complaint of San Martín is that they promised to only sell to wholesalers when they entered the Masaya market, but they are selling in other capacities as well, including directly to housewives.[13] When asked what role the government plays in this

[13] Although we did not get exact dates of San Martín's market entry into Masaya, it is worth noting that Schütz (2004) spoke of San Martín's business and stated that they recently expanded their distribution network to include

process, Ms. Añamendi stated, "The government turns a deaf ear to us, but there is no limit to what they will do for the big companies." Thus, the interviewees suggested that the municipal government should charge a tariff to PROINCASA and San Martín to get their products in the Masaya market, thus increasing the price of those producers' products and eliminating their price advantage over local processors. The interviewees met with the market vendors to confirm that they only reason they buy from PROINCASA is because of price, and then met with the mayor to discuss their concerns on March 8 – he assured them he will help. However, they do not seem convinced that their needs will be met, stating that the municipality has the authority but not the will to force the industrial slaughterhouse people to follow the rules.

Lawlessness – "In Nicaragua, laws were made to be broken." The politicians do not keep their promises and non-compliance with laws is common. The only time citizens can count on their politicians to represent their needs are right before an election. However, as related to the meat processors' needs, they said they do not even get help before the election because they are not visible enough.

Semi-industrialization – under the last municipal administration and mayor, there was a proposal for donations from a Dutch group to fund the slaughterhouse's semi-industrialization. The donations would have funded refrigerated space for pork and hooks on a suspension system for processing cattle (so they wouldn't have to be processed on the floor). All of the processors were very excited about this possibility and the Dutch funders visited the site. However, no one has heard anything since last year's elections, leaving the processors crestfallen.

MAGFOR (Ministry of Agriculture and Forestry) Meeting
17 March 2006, 9:45 AM
Interviewee: Bernabela Orozco Membreno

Background

Ms. Orozco is MAGFOR's director of food safety. Her office handles food safety issues related to exporting Nicaraguan food products, including dairy, meat, poultry, seafood, fruit, and vegetables. To a lesser extent, her division also works on projects to protect the domestic market, from a food safety standpoint. Ms. Orozco has been with MAGFOR since 1998. She started out working on poultry products and last November, she was promoted to the unit's director. Before working for MAGFOR, Ms. Orozco spent her career working for the food industry and holds a master's degree in food studies. Of note, Ms. Orozco said she is the only woman in a director position at MAGFOR. As a result of the Civil Service Law, she cannot be fired because of a change of President, although she may need to be moved to a different, equal position in a different division.

Her division has handled HACCP since 1997, when it began in Nicaragua as a result of United States import requirements. This has gradually expanded to include food safety issues for all non-processed food products. Although HACCP wasn't implemented nationally until 9 years ago, Ms. Orozco noted that Nicaragua had its own, domestic food safety standards since 1964.

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franchised stores. Thus, we think it is plausible that when they entered the Masaya market, they agreed to only sell to wholesalers, but since then, they have changed their distribution to sell directly.

Now, MAGFOR has permanent staff inspecting all slaughterhouses that export. MAGFOR itself is also inspected regularly by the United States and other recipients of Nicaraguan exports to ensure their process for ensuring food safety is sufficient. She noted that the 27th of this month, USDA-APHIS (Animal and Plant Health Inspection Service) will be auditing MAGFOR's procedures.

International collaboration

The food safety division in MAGFOR works closely with international governments and donors. They are currently finishing the first year of a 4-year project with the Inter-American Development Bank (IDB) on the Modernization of Agricultural Services. This project's goal is to capacitate and update Nicaragua's public food safety infrastructure. Specific components of this project include the following: purchase of new equipment and cars, technical staff, a new laboratory complex for microbiological food analysis, and modernization of public agriculture infrastructure (such as buildings).

CAFTA

With CAFTA, Ms. Orozco notes that all producers want to get a piece of the export pie. As related to her office, she said, "our goal is for a company to enter the international market smoothly because if their product is rejected, it reflects on the overall reputation of Nicaraguan meat." Ms. Orozco has no reservations about CAFTA, and stated that CAFTA and globalization have inspired investment and modernization in Nicaraguan agriculture. She noted that CAFTA favors the large industrial meat producers, as they were all already approved for export to the United States before CAFTA existed.

Challenges in the local meat market in Nicaragua

Ms. Orozco said there is no such thing as a small industrial slaughterhouse in Nicaragua. Rather, she noted that the meat industry is a dichotomy, consisting of large industrial slaughterhouses and small traditional processors.

She stated that the industrial slaughterhouses are all large meat processors, and that all except one focus on the export market. Their only true challenge involves staying on top of the latest technological advances to improve their production, stay competitive, and meet the most updated international food safety regulations. When asked about the small traditional processors, Ms. Orozco stated that they have a vast quantity of challenges to compete. However, she did not go into very much detail, noting that her office does not work with the small processors. Rather, MINSA is the agency that deals with them. Of the little she said, it was noted that the traditional processors' and municipal slaughterhouse's quality greatly varied by locale in Nicaragua. For example, she had visited the market in San Juan del Sur[14] and the market where the traditional processors sell their meat was very neat and well kept. However, she is certain that not all municipalities take such good care of their public health responsibilities. Another obstacle Ms.

[14] We would like to add that San Juan del Sur is a fairly popular tourist and surfing beach destination in Nicaragua. Thus, it is not surprising that their municipality is taking better care of its public health standards, as sick tourists would drive down their economy.

Orozco noted for small processors is that they have limited communication from one city to another, thus it is hard for one city learn from another city's successes or failures. Ms. Orozco stated that she feels the high quality of meat in the industrial market will only help small processors and inspire them to improve their own quality in order to stay in business.

When asked about clandestine operations, Ms. Orozco noted that MINSA handles those issues. However, she noted that there are considerable risks with clandestine operations due to high risk of illness and contamination and lack of sanitary measures to promote food safety. She believes that MINSA has made some progress.[15]

Ms. Orozco diplomatically stated that MINSA is underfunded and has some management issues. Because of this, it is really up to the municipalities to ensure improvement of their local slaughterhouses and promote the creation of brand and market (i.e. business development) among their small processors.

Capacity building plans

Although this is not in Ms. Orozco's unit, she mentioned that MINSA has a strategic plan to help develop the municipal slaughterhouses. MINSA will help the municipal slaughterhouses create plans to modernize their facilities, although all funding would have to come from the municipality itself.

Of more promise, Ms. Orozco described a pilot project to educate consumers and businesspeople on food safety issues. This project is a joint effort by MAGFOR, MIFIC, and MINSA, and started one year ago. The project focuses on outreach and providing consumers with information issues related to selecting, handling, and preparing safe meat. This project is directed at all consumers in Nicaragua, and will also reach producers through their industry associations.

[15] When we shared this information with Tania Casaya of CLUSA later on March 17, she noted that as far as she knows, clandestine operations are very uncommon now in the Pacific part of the country because of MINSA's efforts. Rather, clandestine operations are more common in the central parts of the country that are very remote, far from formal markets, and only are accessible by donkey. Thus, in order to have any meat at all, clandestine methods are basically the only options that locals have.

Cold Chain Technologies Program: Stakeholder Analysis Report

Funded by The United States Agency for International Development (USAID)
Under Partnerships for Food Industry Development (PFID)
In Cooperation with Louisiana State University

Submitted May 2006 by
Robert Dickson

"...serving the global food industry."

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1 PREFACE

1.1 Introductory Statement

WFLO's Cold Chain Technology (CCT) project attempts to identify a link, or specific process, in the cold chain, the improvement of which can lead to increased operational efficiency and/or a higher value product. With guidance from WFLO, the staff and stakeholders conduct technical and economic case studies to determine the feasibility of that process. If such case studies have positive results, stakeholder enterprises are encouraged to adopt such a process on a commercial level.

In the short term, implementation of proposed technologies requires labor and perhaps some minor to moderate investment in a new technology to ensure success. In the long term, addressing inefficiencies in the integrated cold chain through this activity will ultimately increase the food industry's capacity to expand production and employment opportunities in a sustainable manner.

The CCT project includes a three-step process for implementation and evaluation, including the following steps:

Step One: Assessment & Identification: With guidance from PFID-MSP specialists, in-country support offices and stakeholders will identify a process or technology that addresses a critical cold chain need. Priority will be given to processes that increase energy efficiency or improve a product's quality in relation to a market standard.

Step Two: Case Study Analysis: The in-country office will secure a commitment from selected stakeholders to test the technology on an experimental level, thus determining the technical feasibility of the procedure. The case study testing will include relevant research to test the efficacy of the technology, and may include a cost/benefit analysis to determine the technology's overall feasibility.

Step Three: Promotion of Commercial Level Adoption: If the identified technology is determined to be feasible, the in-county support offices will share this information with stakeholders and with potential consumers. It is anticipated that the commercial prospects will be readily apparent to the stakeholders, particularly to those who participated in the case studies. At this point, the Project's role will be to provide technical assistance as needed, monitor results and impact (energy savings, reduced expenses, product quality, etc.) and advocate the expansion of the process when possible.

1.2 Scope of Work

NAME OF TRAVELERS:	DESTINATIONS:	DATES:
Robert Dickson, Team Leader	**Stellenbosch, South Africa**	**March 29-April 2, 2006**

PURPOSES: Conduct activities for the following PFID Cold Chain Technologies (CCT) Project (Leader Award):

- To conduct an on-site analysis of potential Cold Chain Technologies in the country of South Africa, including visits with potential stakeholders.

DATE(S)	LOCATION	ACTIVITY
Wednesday, March 29	South Africa	Arrive in South Africa
		Meeting with HCPI leadership
Thurs.-Friday, March 30-31	South Africa	Review of CCT concepts & stakeholders
Saturday, April 1	In Transit	Team Leader departs for U.S.
Sunday, April 2	In Transit	Arrive in U.S.

2 RAPID CHILLING OF HOT BONED OSTRICH MEAT

In hindsight, the demand for ostrich meat might be considered an accidental market. Ostrich were originally slaughtered for the valued skins and feathers they produced, with little energy or thought placed on the meat products, which were considered to be a by-product and of little or no value. However, as more efforts have been expended in the slaughter and processing areas, we are now beginning to understand the effects of various treatments and situations that occur in ostrich meat. As well, with any other business, the meat must be processed, handled and delivered to the consumer in an economical manner allowing Ostrich meat to be competitive with other protein sources.

With this in mind, processors in harvest facilities have expressed interest in pursuing accelerated processing of Ostrich carcasses. For the purposes of this report, accelerated processing may be defined as any series of operations, interventions or treatments which effectively reduces the amount of time required to deliver the final product to the consumer.

It has been well documented that "hot boning" in association with electrical stimulation has been shown to significantly enhance eating characteristics of rapid or accelerated processed meats including ostrich and other exotic meats. Hot boning is defined as the removal of muscle tissue from the carcass in advance of the onset of rigor mortis, or "death stiffening". Accelerated processing lends itself to specific economic advantages such as 1) reduction of evaporative weight loss during the carcass cooling process, 2) making the product available for use sooner, thereby reducing investments in inventory and storage costs, 3) enhancing product tenderness earlier in the production process, and 4) upgrading slightly tougher meat by utilizing advanced technology to enhance tenderness and palatability.

2.1 Project Scope

The final outcome of this project is to determine the best practices for removing pre-rigor or "hot boned" muscle from ostrich carcasses and packaging it in either a wholesale or consumer ready format. Early focus should resolve around retrieval of the specific muscle cuts that can be either packaged as they are, rapid chilling to make the products ready for the consumer or packaged in bulk packs that can be utilized by food service or other further processors. Cooling rates and methodologies to reduce temperatures in various muscle cuts would need to be considered.

2.2 Project Methodology & Timeline

In order to accomplish this task and determine the best process application, several issues need to be addressed and are outlined below.

1) The post harvest to packaging time and temperature rate of reduction curve for individual muscle masses must be determined, measured and plotted. Some of the larger muscles may need to be packed in larger wholesale portions and may need special cooling treatments to attain proper end-point temperature thresholds.
2) Once packaged, the time and temperature rate of reduction curve in the package will need to be determined. Additionally, aerobic and anaerobic bacterial critical limits will need to be determined for proper food safety management.
3) In order to assure that any cooling processes interventions used do not have a negative affect on tenderness and/or texture and eating quality, the following measurements will need to be made.
    a. Warner-Bratzler shear values for tenderness.
    b. pH measurements to assure electrical stimulation is doing its job.
    c. Muscle Color scores
        i. At boning
        ii. At the same time as micro evaluations are done on packaged materials.
    d. Final microbiological plate counts going into the package compared with microbiological plate counts during various times post packaging to determine if product properly holds up during transportation. These

shelf life evaluations should be made 0, 1, 4, 7 and 10 days post-processing.

Depending on the capabilities of local laboratories and the slaughterhouse processing schedule, the following timeframe would be considered adequate for this project.

Date(s)	Location	Activity
Days 1-2	In Processing Facility	• Process Evaluation • Benchmarking/Physical Measurements
Days 3-5	In Processing Facility	• Research Data Collection
Days 8-10	Outside Laboratory	• Microbiological Shelf Life Analysis • Final Evaluation

2.3 Potential Benefits to Industry

This is an intriguing project from the standpoint that it utilizes many current accelerated processing technologies that are already in place throughout the world. It also lends itself towards the development of some uses for ostrich meat that as of this date have not necessarily been explored. Some of those areas are in the further processing area where current cuts of ostrich meat could be enhanced by various processing adjuncts to improve their utilization. This could include, but not be limited to mechanical treatments during the cooling process which would enhance the organoleptic properties (juiciness, flavor and tenderness) of the specific cut; marinating to add flavor or introduce tenderizing adjuncts; and development of new products and product lines.

3 ELECTRICAL STIMULATION OF EXOTIC GAME HARVESTED IN THE WILD

This could be considered an ancillary project to the above ostrich project if both funds and time were available. The effects of electrical stimulation (ES) utilized on exotic game animals that have been harvested under as ideal of conditions in the field as is possible to prevent stress (induced dark cutters) would be evaluated.

3.1 Project Scope

Farm raised wild game animals are raised on a diet of natural grasses and bushes on large tracts of fenced land, simulating wild conditions and without intensive farming efforts or management. Due to this management style, combined with the unique yet mandatory method of slaughter, whereby hunters sacrifice large numbers of animals using high powered rifles from a distance (with animals remaining un-processed for

extended periods of time), there is a great deal of variability in the degree of tenderness of each animal. The final outcome of this project would be to determine the effectiveness of utilizing an Electrical Stimulation (ES) unit attached to a mobile generator to stimulate carcasses immediately after stunning.

3.2 Project Methodology & Timeline

Electrical stimulation applied to the carcass prior to the completion of the rigor mortis, process as outlined in a previous section, could have a potentially positive effect on the final texture and tenderness of the meat. Since the animals are harvested in the field, other variables to consider would be the effect on transport from the harvest site, and the effect of delayed exsanguination (bleeding), dressing and cooling of the meat. This additional technological step could provide an advantage in providing high temperature aging for the smaller game type animals thus reducing the potential effect of "Cold Shortening" on the muscle. As well, there may be some consideration as to effects of timing and duration of treatment and, there may even be a need for consideration of utilizing hot boning of carcasses.

Since ES rates and values for exotic game have not been established, the following determinations and measurements would need to be made.

1) Stimulation time (Duration, volts)
2) Cooling process. Is it enhanced or delayed by ES?
3) Does the pH drop accordingly as in other species?
4) Warner-Bratzler shear values compared with non-stimulated muscle
5) Yield. ES vs. control carcasses vs. aged carcasses

Date(s)	Location	Activity
Days 1-2	In Field	• Process Evaluation • Benchmarking/Physical Measurements
Days 3-5	In Field & Processing Facility	• Research Data Collection
Days 8-10	In Field & Processing Facility	• Process Evaluation

3.3 Potential Benefits to Industry

While this concept for a CCT project is excellent, the total economic impact made on the region and the limited number of companies involved in this type of venture limits the overall impact of the project.

4 IMPACT OF STRESS REDUCTION ON PORK QUALITY & PALATABILITY

The relationship of pre-slaughter stress to the degree of unacceptable quality pork products has been well documented in the past few years. Researchers have found links to poor quality pork products a direct result of the way animals have been treated during their growth periods and those periods leading up to and just prior to slaughter activities.

Problems have been found in the way pigs are transported from the farm to the slaughter facility. Inadequate room, poor loading ramps and inadequate ventilation during the trip have been the cause of sever muscle breakdown and poor quality consumer products. At the packing house, pigs in the past were often held in tightly packed spaces with little or no room for movement. On cold days this was not a problem as the pigs would huddle together for warmth. However, on warm days, with inadequate ventilation or no cooling water to get into (pigs have no sweat glands to help cool them), some pigs were found either heat stressed or dead, and those animals that made it through the slaughter process were often found to have inferior muscle quality once the meat was consumed.

Ecchymosis, or blood splash as it is called in laymen's terms, is the direct result of the stress associated both with the events leading up to and including the stunning process. Stresses which have been identified as contributing to blood splash include, but are not limited too, lairage (both overcrowding and heat), movement of pigs during hot periods of the day with little or no ventilation then taking them directly onto the slaughter floor, and the stunning process (high voltage).

4.1 Project Scope

The first step of this project would be to assess the entire process from farm to finished carcass and beyond to the wholesale and retail cuts and try to determine if any one particular aspect was contributing a greater role on the stress of the animals than any other. Once this benchmarking was complete, changes in the way animals were handled would be initiated, with an emphasis on pre-slaughter handling systems and slaughter methodology. Anticipated pre-slaughter handling modifications might include 1) misting the animals once they arrive at the slaughter facility and giving them time to cool down and rest after transportation; 2) transporting and slaughtering animals at night during to reduce the effect of heat on the animals; 3) determining the footing and handling facilities prior to the stunning operation to make sure they are in line with current animal handling guidelines for stress reduction and 4) evaluation of the stunning process to make sure the animals are not over/under stunned or in some way not being properly stunned.

As changes are made in the animal handling and stunning process, evaluations of the carcasses would be made to assess the presence and/or degree of blood splash in the muscle tissue.

4.2 Project Methodology & Timeline

Date(s)	Location	Activity
Days 1-2	In Processing Facility	• Process Evaluation • Benchmarking/Physical Measurements
Days 3-5	In Processing Facility	• Process Evaluation • Physical Measurements

4.3 Potential Benefits to the Industry

Purchasing high quality animal protein products has always been a number one priority of consumers. Defects which downgrade the final product quality only serve to alienate the consumer from ever trying a specific product again as well as reducing the financial return to the farmer/producer which raised the animals. Negative product traits, such as blood spots in the meat, generate a negative image within the mind of the consumer. Poor pre-slaughter handling of animals is perhaps the greatest contributing factor, other than genetics, to pork meat quality. Furthermore, pre-slaughter treatment is easily modified and managed for maximum impact and profitability.

Reducing the impact of an easily solved problem would lead to greater returns to both the packer and the producer. Fewer products would have to be trimmed or placed into alternative products to be marketed at a lower price.

5 CONCLUSIONS

In all, any of the three projects holds merit and could almost be done in some cases in a simultaneous manner. However, in ranking them, I would recommend the Ostrich project receive priority as the number 1 project, followed by the blood splash in pigs and then the electrical stimulation of the exotic game.

Training Needs Assessment:
Cold Chain Training Course for South Africa

Funded by The United States Agency for International Development (USAID)
Under Partnerships for Food Industry Development (PFID)
In Cooperation with Louisiana State University

Submitted May 2006 by
Lorien Onderdonk
Corey Rosenbusch

Additional information regarding this report can be obtained from the World Food Logistics Organization (WFLO).

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Objective

As a component of the USAID Partnerships for Food Industry Development (PFID) program, WFLO and its partners the University of Stellenbosch (SUN) and Louisiana State University (LSU) have been charged with the establishment and the development of a Postharvest Technology Center (PHTC) at SUN in South Africa. The PHTC's primary goal is to serve as a platform for PFID services in the region. These services center around broadening the application of HACCP and promoting value-added postharvest technology. In addition to industry benchmarking and research, the PHTC will offer training to the food industry in southern Africa.

The objective of this training needs assessment was to ascertain the needs of the industry as they pertain to the handling of perishable, specifically refrigerated and frozen, food products with the ultimate intent of designing a short course to address at least a portion of these needs.

Background

In August of 2005, John Ackermann of the Southern African Refrigerated Distribution Association (SARDA) organized a meeting of food industry professionals in order to discuss the need for a cold chain training course. This group of fourteen—representing processing, cold storage, refrigerated distribution and major supermarket chains—identified the following goals for the cold chain industry in southern Africa:

a. improvement of cold chain efficiency so that the quality of the grown, caught or produced product can be passed to the consumer, thereby boosting exports and decreasing wastage;
b. compliance with international food safety requirements (HACCP) so as to reduce incidence of food-bourne illnesses;
c. compliance with international standards for food traceability;
d. education of the southern African consumer as to the benefits of efficient cold chain distribution; and
e. increase in the level of energy efficiency in order to lessen strains on local energy grids and lower operating costs.

In order to address the above issues, the group brainstormed a list of topics and subtopics that might be included in what it termed a "Cold Chain Management Course". Some of these included: basic principles of refrigeration, preservation of perishables, temperature measurement and control, refrigerated vehicle, and supermarket vending equipment. A complete list with subtopics is included as Attachment A of this document.

In reviewing the topics developed during the August meeting, WFLO noted that one course encompassing all this material could easily become unweildy and may not draw an audience with a more narrow set of job duties. Based upon the recommendations of the group, WFLO proposed the design and implementation of a short course covering either basic warehouse operations or a short course pertaining to product handling/display at the supermarket. In order to ascertain which topic ought to be developed further as the PHTC's pilot program, WFLO conducted a needs assessment of the sectors relevant to the two proposed courses—refrigerated warehouse facilities and supermarkets.

Needs Assessment

Basic Warehouse Operations Course

In the original project proposal and in preliminary discussions in the spring of 2005, Dr. Louw Hoffman with the University of Stellenbosch (SUN) expressed a desire to conduct an annual training event that would mirror WFLO's program in North America (known as the "WFLO Institute"). This event would coordinate the training of cold store managers and supervisory staff to improve international product marketability, stock control and general storage efficiencies.

While the Institute formula appears to work well in North America, WFLO was hesitant to assume that the same model would succeed in southern Africa. The North American Institute, held in Oklahoma, is a program which has evolved over the course of some 40 years. With no formalized curriculum, the program relies heavily on industry veterans (actual refrigerated warehouse operators) to provide instruction, based upon years of experience, to approximately 300 students each year. Furthermore, the Institute is meant to provide an overview of the public refrigerated warehousing (PRW) industry—excluding private facilities. In southern Africa, however, the PRW model is not as prevalent due to the vertical integration of much of the food industry. Finally, the WFLO Institute's primary aim is to provide an overview, which means course content ranges from human resources, to finance, to food safety. The audience runs the gamut from IT personnel, to sales/marketing staff, to forklift operators. Based upon the information gathered by SARDA at the preliminary session in August 2005, this aim is not in line with that of the cold chain industry in southern Africa. According to SARDA, the industry requires a much more specific course targeted at management.

In order to better identify the region's specific needs, the following information was gathered via a variety of means including facility visits, personal interviews, and surveys:

a. overall objectives of the training;
b. target audience;
c. topics to be covered;
d. optimal delivery methods;
e. ideal timing; and
f. willingness of employers to pay.

The individuals who participated in these exercises were primarily general and area managers of private and public cold stores. A list of participants in these activities is included as Attachment B of this document.

Overall Objectives of Training

Participants in the assessment continually identified boosting of cold chain awareness as the primary objective of the training. WFLO heard on several occasions that there existed a lack of basic understanding of the sensitivity and special requirements of perishable products. This could be traced, in part, from minimal or no knowledge of basic food science (e.g., fruits and vegetables are living things) to misunderstanding the basics of refrigeration and how it impacts product quality. Finally, there seemed to be a desire to raise professionalism in the sector, which could potentially bolster the region's competitiveness in the export market.

Target Audience

Without exception, the group of warehouse employees identified for training were what we will call for the purpose of this report "area managers" (e.g., operations manager, maintenance manager, perishables manager) and senior level supervisors who demonstrate management potential. The typical organizational structure of refrigerated warehouse facilities in the region consists of a general manager who oversees two or more area

managers. Supervisors report to one of the area managers and have responsibility for overseeing a variety of other workers, including forklift drivers, operations clerks, timekeepers, and other general workers.

Area managers and supervisors generally shoulder responsibility for some combination of the following:

a. loading and unloading of product;
b. inventory control;
c. control of cold room operations;
d. supervision/monitoring of housekeeping;
e. planning and scheduling distribution service;
f. daily planning and scheduling of labor;
g. safety of materials handling equipment;
h. regulations compliance; and
i. facility security.

Generally, those interviewed noted that workers at the middle management levels, particularly at the supervisor level, are typically black workers who may not have a high school education. The manager from the SPAR supermarket distribution center, however, indicated that all of that company's supervisors have to have matriculated high school. One food industry consultant for the region noted that the level of training and education of this group is varied. By concentrating on those supervisors for whom advancement appears a real possibility, some discrepancy in the educational backgrounds of the participants may be avoided.

Topics to Be Covered

Numerous topics were identified as need areas; however, the most frequently cited was basic food science. Under this category, those interviewed mentioned issues such as cross-tainting (odor transfer), importance of relative humidity and the effect of cold temperatures on product shelf life. Other areas included:

a. creating awareness of HACCP;
b. truck loading procedures;
c. energy management;
d. basic refrigeration;
e. international food safety standards;
f. utilization of space;
g. efficient product movement;
h. basic hygiene and sanitation; and
i. carton integrity.

Energy management and refrigeration appear to be very timely subjects particularly in the Western Cape where several power outages have occurred in recent months. In this context, operators wanted to know how to lessen their facilities' drain on local power grids and what measures they could take to protect perishable products during a blackout.

The high prevalence of Acquired Immune Deficiency Syndrome (AIDS) among sub-Saharan Africans (one source estimated 7.2% in 2005), makes basic hygiene and sanitation another concern to operators.

Managers at both Commercial Cold Storage, a third-party operator, and SPAR demonstrated interest in the courses outlined in a promotional piece for the WFLO Institute in Oklahoma. They indicated that several of the courses would be well received in southern Africa;

however, they felt that others were currently being offered by other providers (e.g. forklift safety, HACCP, human resources-related courses). They did not believe that the project ought to replicate preexisting training efforts.

Optimal Delivery Methods

Given the varied background of the learners, those interviewed indicated that some combination of lecture and practical demonstration would be the optimal means to present the information. When suggested, facilitated group work and case studies were also well received.

Ideal Timing

There were several points to consider when determining the best time for the course: a.) day(s) of the week, b.) time of the year, and c.) length of the course.

The middle of the week was clearly identified as the best time for employees to attend an off-site training course. Thursdays, Fridays and Mondays were cited as particularly busy days of the week as product tends to move faster over the weekend. Times of the year to avoid offering training are holidays—particularly Christmas and Easter. Generally, fall (March-May) is also considered a festive period with several national holidays. Several course lengths were given, ranging anywhere from two to five days. Most of the individuals interviewed said that they felt allowing employees a couple consecutive days for training would not be an issue; however, if the training course were to be longer, they would recommend spreading the sessions out over several weeks.

Willingness of Employers to Pay

As this type of course is not presently available in southern Africa, the amount an employer could be expected to pay is yet to be determined. It was mentioned that the PHTC would be setting the benchmark and that the quality of the curriculum and the experience of the faculty would dictate the price. Some indicated that faculty from outside South Africa would lend credibility to the program. Each party questioned expressed an interest in the course and believed that his facility would consider sending participants. As one stated, any company serious about training would pay. One consultant to the industry estimated ZAR $10,000 ($1,600 USD) for a five-day course.

Product Handling/Display at the Supermarket Course

In its list of recommended topics, the group at SARDA's August 2005 meeting identified "Supermarket Vending Equipment" as a point of interest for training. Possible areas to be addressed under this topic, according to the group, included: design and operation, loading, temperature monitoring, defrosting and energy conservation. In many value chains around the world, the retail outlet is often the culprit for breaks in the chain. Furthermore, the increasing usage of value-added packaging and fresh-cuts has allowed retail markets to boost profits. For these reasons, WFLO proposed a course that would potentially expand on the topic of vending equipment to encompass perishables handling and display in the supermarket.

In order to gage the need for cold chain training at the supermarket level, WFLO adopted a two-step approach. The first step was to pull together a small focus group of stakeholders to discuss the aims and design of a potential course. The second step was to conduct site visits to several of the major chains as a follow-up to the group exercise.

Focus Group

A group of four, including a representative from the Checkers supermarket chain, a food industry consultant, a SUN faculty member with specialty in retail, and Host Country Partner

Institution (HCPI) representative Dr. Louw Hoffman, were led through a three-step process during which they were asked to: a.) identify food handling issues in the region's supermarkets, b.) participate in a team activity designed to determine audience, topics, timing and delivery, and c.) discuss the results of the team activity in order to clearly identify course parameters. A list of participants in these activities is included as Attachment B of this document.

Issues identified by the group included:

a. basic lack of knowledge (e.g. allowing product to thaw and then refreezing);
b. stock rotation issues—first in, first out not always followed;
c. merchandisers removing product from mis-stocked display cases during store audits;
d. receipt of abused product from carrier;
e. lack of basic knowledge about freezing;
f. lack of knowledge about proper disposal techniques;
g. issues with ready-to-eat (prepared) meals;
h. management's inability to devise creative solutions to problems;
i. low energy conservation awareness (e.g. open freezer doors);
j. disinterest of part-time workers in maintaining the quality and integrity of the system; and
k. health and safety issues related to food handling (e.g. AIDS).

The four participants were then split into two teams to work on a training design exercise, included as Attachment C of this document. During this exercise, the teams were asked to consider the course and determine:

a. overall objectives of the training;
b. target audience;
c. topics to be covered;
d. optimal delivery methods;
e. ideal timing; and
f. willingness of employers to pay.

After 20 minutes, each team presented its responses and each point was discussed by the group, who decided that the overall objective of the course would be to motivate supermarket employees to handle frozen and chilled product in a safe, efficient manner. They felt that this could best be done in the form of a train-the-trainer (TTT) program, which would likely be most useful if it were commodity-specific. The newly trained trainers, likely department supervisors, would then pass the information along to their subordinates at the store level. Some topics might include:

a. principles of biology and temperature;
b. application of the principles to each step at the facility—receiving, holding, display, customer, returns; and
c. basic hygiene—not to turn into a HACCP program.

The participants nixed the idea of doing value addition as a topic, as they felt this would be more relevant to another course. They also believed that supermarkets were already doing an adequate job in this area. Demonstration was cited as the key delivery method, aided by a "trainer's kit", which would then be provided to the trainers for use in their own programs.

On the question of timing, the group indicated that trainers could be trained for a condensed period of time; whereas, workers who were being trained in the store might only be released for training in three to four hour intervals. Training would ideally be delivered outside of peak holiday times (Christmas, Easter) and not over/around weekends.

A key issue raised by the focus group involved the level of education that the majority of supermarket employees have achieved. As most have received less than a high school education, any course provided to them must be certified by the Sector Education and Training Authorities (SETA) of South Africa, under the Skills Development Act (1998) and Skills Development Levies Act (1999). The acts require employers to pay a percentage of their annual payroll to the South African Revenue Services. Employers may then request a partial refund for each employee given the opportunity to attend an accredited training course.

Even if those receiving the TTT training have matriculated high school, meaning the University of Stellenbosch (SUN) may offer the course directly under its banner, the curriculum which they would then use to train subordinates would have to follow the SETA guidelines and would, therefore, have to be administered indirectly via SUN's partnership with Northlink College. Furthermore, the low level of education correlates with a low level of literacy.

Notes from this session are included in this document as Attachment D.

Site Visits

As follow-up to the focus group activity, WFLO conducted walk-throughs of four leading South African supermarket chains: Checkers, SPAR, Pick 'n Pay, and Woolworths. A walk-through of these facilities revealed rough handling of produce (causing bruising, abrasions), lack of knowledge concerning which fresh products ought to be stored together (e.g. ethylene producers next to non-producers), overloading of vending equipment and failure to close freezer doors. These issues were noted to varying degrees at each location. Overall, however, product display was pleasing, and there were many value-added options (e.g. ready-made salads and precut fruit). Based upon its freezer/cooler cases, Woolworths, particularly, places much emphasis on the aesthetic appeal of its products. A look into the cold rooms at two supermarkets showed that product is generally stored off of the floor, racking did not seem to hinder air flow, and in many cases strip curtains were used in addition to cooler/freezer doors to maintain cold temperatures.

Supermarket A, Stellenbosch

At Supermarket A, WFLO spoke with the general manager. According to her, each department has manuals available on food handling; however, there is not a high literacy rate among floor staff (reading of product labels is a challenge to some). There is some video training of new employees at the store level, but the videos are dated and primarily focused on customer service issues.

She indicated that most training is conducted as "trickle down" from senior workers to newcomers. For instance, the store is audited every other month, at which time the auditors will provide instruction as needed to the area managers/supervisors who will then pass that information along to their subordinates. New stores receive training in customer service. The only organized training is periodically offered to deli/bakery workers. The general manager nominates employees for this training and then the corporate office determines who will participate.

She feels strongly that training from an outside source would empower employees and positively impact their behavior. In the present climate, she said, there is a certain level of distrust between managers and employees. Outside training would demonstrate to employees that the company views them as an asset. She also felt that this type of

investment in the store's employees may entice them to stay longer, thereby decreasing what is currently a high turnover rate.

Supermarket B, Stellenbosch
At Supermarket B, WFLO spoke with the general manager, who described the company's current training efforts. Several times a year, management selects an employee to attend a train-the-trainer program, conducted by corporate headquarters. These employees become "mentors" for other employees at their location. Training is then administered periodically at the store level for new employees or for employees requiring refresher training. In addition, all new employees receive a two-hour introduction to food safety, which includes a discussion on bacteria and proper sanitation practices. According to the manager, training has been conducted in this format for the past three years. The store is audited once a month, at which point additional training is done in areas where problems exist.

The primary issues he faces on a daily basis are: a.) the high rate of employee turnover, and b.) damaged product received from the shipper, particularly dairy items. He believes that his store's training needs are adequately addressed.

Supermarket C, Stellenbosch
Postharvest Technology Center Coordinator Suné Botha found that the training situation at Supermarket C showed similarities to that at Supermarket B. The store's manager indicated that all staff members are routinely trained in food safety, quality, and hygiene. This training is coordinated by headquarters. Staff also have an opportunity to receive training in computer usage and customer care at a local college. More specialized training is available for blok-men and other staff working in the meat department. Further training, he said, was done in-store as necessary. Like the manager at Supermarket B, he did not see an opportunity for training outside of what the company already coordinates.

Conclusions

Basic Warehouse Operations Course
Based upon the information collected during the needs assessment activities, WFLO has determined that it will proceed with the development of a short course directed toward area managers and senior level supervisors of refrigerated warehouses. The general consistency of the responses from operators and industry role players corroborates that the needs in this sector are rather clearly defined.

As such, a 2.5 day course is recommended, which will, pending further feedback, include some combination of the following modules:

- Introduction to Warehouse Operations;
- Sanitation Standard Operating Procedures (SSOPs);
- Food Science Basics;
- Refrigeration Fundamentals;
- Energy Management;
- Innovations in Warehouse Technology;
- Forklift Safety and Maintenance;
- Emergency Procedures Training; and
- Crisis Management.

Once the curriculum has been drafted, SUN will circulate it, along with a brief questionnaire, to industry stakeholders in the region for their comments and recommendations. This step will confirm the assessment conclusions and allow us to project the number of participants who will attend, as well as what fee the PHTC can reasonably charge. The questionnaire is included as Attachment E of this document.

WFLO will seek professional SUN faculty members and experts from the industry in South Africa to deliver the course content, as well as some from overseas. Many needs assessment interviewees indicated that expertise from outside of the region would lend credibility to the course.

Product Handling/Display at the Supermarket Course

This course will be tabled at present. Based upon the feedback received from the industry, particularly during the site visits, there are many variables to consider if training were to be provided in this area. First, two of three managers interviewed indicated that they saw no need for a training course. Irregardless of the validity of their statements, one could conclude that enrollment numbers would likely reflect this sentiment. Secondly, the high rate of employee turnover negates the training, or would at least render the additional cost unappealing to those entities footing the bill.

There may still be some possibility to offer this training; however, the approach would need to be somewhat different. For example, one might explore the option of allying with a particular chain that would be open to outside training (e.g. Checkers), rather than targeting the industry as a whole. In this case, TTT may still be the preferred method as employee turnover is a dominating issue.

Not included in this assessment were small, locally owned and operated markets that do not adhere to the same level of care as the major chains. Though training would likely benefit these outfits, ability to pay a registration fee for such training presently renders this option cost prohibitive.

Attachment A: Cold Chain Management Course Topics

Basic Principles of Refrigeration
- Heat/Energy
- Temperature
- Transfer of Heat
- Basic Cooling Cycle
- Air Circulation

Preservation of Perishables
- Handling & Storage Requirements
  - Fruit & Vegetables
  - Meat & Poultry
  - Fish
  - Milk & Dairy Products
  - Cut Flowers
  - Confectionary
  - Prepared Meals
  - Pharmaceuticals
- Specific Heat
- Cross Tainting
- Freezing
- Heat of Respiration
- Controlled Atmosphere Storage
- Packaging

Cooling Load of Refrigeration Plant
- Heat Leakage
- Product Load
- Latent Heat (freezing)
- Air Infiltration
- People & Machinery
- Lighting
- Defrosting

Freezing/Chilling Plant
- Rapid Cooling Tunnels for Fruit
- Hydro Cooling
- Blast Freezers
- Tunnels
- Vacuum Cooling
- Ultra Low Temperature Plant

Temperature Measurement & Control
- Sensor Types
- Thermometers
- Measuring Protocol
- Temperature Control
- Calibration of Sensors
- Recorders
- Type of Instruments
- Thermostats

Cold Store Design
- Insulation
- Vapour Barrier
- Racking
- Air Distribution
- Energy Conservation
- Air Locks
- Fire Protection

Refrigerated Vehicle
- Basic Design
- Refrigeration Systems in Use
- Air Flow
- Loading & Unloading
- Maintenance
- Operating Costs
- Legal & Hygiene Requirements

Refrigerated Marine Container
- Basic Design
- Refrigeration Systems in Use
- Air Flow
- Stacking Patterns
- PPECB Inspections

Supermarket Vending Equipment
- Design & Operation
- Loading
- Temperature Monitoring
- Defrosting
- Energy Conservation

Traceability
- HACCP
- Food Regulations
- Quality Control

Continued next page…

Attachment A: Cold Chain Management Course Topics

Cold Store Operation

- Personnel Safety & Comfort
- Stock Management
- Order Picking
- Moisture Control
- Mechanical Handling Equipment
- Energy Conservation

Procedures

- Shipping Documentation for Containers
- Insurance for Perishables
- Insurance Claims for Perishables

Attachment B: Needs Assessment Participants

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Attachment B: Needs Assessment Participants

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Attachment C: Supermarket Training Needs Assessment

Training Design Exercise

Team Activity
You and your team are now challenged with the task of designing a training program based upon the needs you have seen and that we have discussed today. This training design will help chart the course for the training to be offered by the PFID project and the SUN Postharvest Technology Center. Your wisdom will provide an outline for a course that can be provided on a sustainable basis for many years to come through the teamwork of SUN, the private sector, and the government. Your team should complete a brief presentation to the group of your recommended training program, including answers to all of the following issues.

1. What are your overall objectives of the training? (write 2 or 3 overall objectives)

2. Who would be included in your target audience and what are their characteristics (age, education, languages, etc.)?

3. What topics would be covered in the training? (5-10) Modules/Topics)

4. What training/delivery methods would be used (demonstrations, hands-on activities, skill development exercises, lecture, study tours, multi-media, etc.)?

5. What would be the ideal timing? (duration, schedule, time of year, etc.)

6. What would be the approximate amount supermarkets would be willing to pay per person for this training?

Attachment D: Supermarket Focus Session Notes

Thursday, March 16

Participants: Allen Ranft, Food Consultant, Food Surveys
Brian Kritzinger, Project Manager-Meat Markets, Checkers
Food Retail Specialist, University of Stellenbosch
Louw Hoffman, Meat Science Professor, University of Stellenbosch

Issues Identified by the Group:

- Basic lack of knowledge (e.g. allowing product to thaw and then refreezing)
- Stock rotation issues; FIFO not always followed
- Merchandisers chuck product out of display cases that doesn't belong there during store "audits"
- Product does not always arrive in good shape
- Cold chain management lacking basic knowledge of what constitutes freezing
- Proper disposal is lacking-- some practices are illegal
- Issues w/RTE foods (?)
- Management demonstrates an inability to devise creative solutions to problems
- Energy conservation awareness (e.g. open freezer doors)
- Part-time workers show disinterest in maintaining quality/integrity of system
- Health/safety issues related to food handling (e.g. AIDS)

Team Activity:

Group 1, Ranft and Retail Specialist

Objective: Cold Chain Awareness
Discipline of the Cold Chain--not a job per se
On floor results

Audience: Train key people in the store, teach them to work within the parameters of their own store
Get a mix of management and staff on the floor
Language: English/Afrikaans/Maybe Zulu

Topics: Receiving-->Holding-->Display-->Customer-->Returns
Customer education, e.g., they should not buy their frozen food first
Returns should NOT make their way back to the shelf

Timing: Feb.-Oct., 2 full days at most

Money: R1500/person/day
Give them something they can take home as a reference (CSM)

Delivery: Training should take place in the store; people are not going to go to Stellenbosch
Conduct training for staff and a manager, and then have them work together on a plan

Continued next page…

Attachment D: Supermarket Focus Session Notes

Group 2, Kritzinger and Hoffman

Objective: Improving shelf-life
Improving customer satisfaction w/good product quality
Improving the basic hygiene knowledge and food safety practices among floor staff

Audience: Managers are well-trained, but they don't often have the time to train their staff.
Key people: receiving clerks, floor staff supervisors
Age groups are diverse; language would be English, possibly Afrikaans
Another idea would be to train the folks who are already doing supermarket training
Education level of floor workers is high school or lower, generally

Topics: Basic biology, e.g. bacteria, how it grows, spreads, etc.
Basic food safety, e.g. temperature control
Logistics, e.g. best times for receiving, maximum times to be out of refrigeration, etc.

Delivery: multimedia, strong in AV
actual demonstration

Timing: Early in the year, like Jan/Feb
Middle of the week
3 half days spread over three weeks (if NOT TTT)

Money: Couldn't say

Group Discussion:

General or Commodity-Based? GMP?
Louw- We should teach retailers to develop GMPs for their own product
HACCP is on the books, but not widely applied.

Objective: To change the behavior of supermarket employees such that frozen and chilled product is handled in a safe, efficient manner.

Audience: Training should be done as a TTT, as well as a basic course

Topics: Principles of biology and temperature (basics)
Show how the above are applied in each piece of the flow diagram (this would need to break down for various commodities)
Basic hygiene (NOT to turn into a HACCP program). This could be done as an optional module

*Group nixed the idea of doing value-adds as a topic; felt this would fall under a different course, and that supermarkets were already doing an adequate job with this

Continued next page…

Attachment D: Supermarket Focus Session Notes

Delivery: Lots of demonstration, and done in the facility.
Maybe some light use of PowerPoint, though we need to be sensitive about giving power point to a TTT trained trainer due to tech knowledge.
May consider putting together a kit for the TTT program. This could be sold separately or incorporated into registration cost. This would encourage new trainers to properly conduct the training themselves.

Timing: 3-4 hour chunks of time for training delivered in-store
Feb.-Oct. is not peak
The trainers could be trained at any time for a more condensed period of time

Other: This needs to be a SETA course, as many employers require their employees to complete so many hours of coursework in order to advance.
Trainers we train must be then certified to give a SETA course.

Attachment E: Short Course for Refrigerated Warehouse Employees—Questionnaire

1. Please rank from 1-9 (or higher if you have added others) the following modules in order of industry need in southern and/or South Africa. Please use "1" to indicate the module covering the area that requires the most attention. *You should use no number more than once*.

   _____ Introduction to Warehouse Operations

   _____ Sanitation Standard Operating Procedures (SSOPs)

   _____ Food Science Basics

   _____ Refrigeration Fundamentals

   _____ Energy Management

   _____ Innovations in Warehouse Technology

   _____ Forklift Safety and Maintenance

   _____ Emergency Procedures Training

   _____ Crisis Management

   _____ Other _____

   _____ Other _____

2. Based upon the course material, as outlined, what training needs of refrigerated warehouse operators *have not* been addressed by this short course?

   _____

   _____

   _____

   _____

3. Based upon the course material as presented, do you believe your organization would send participants to the training? Why or why not?

   _____

   _____

   _____

3.b. Approximate number you would send: _____

3.c. Approximate fee you would be willing to pay: ZAR $_____

4. Please submit comments pertaining to the content of any or all of these modules along with the completed questionnaire to: londerdonk@iarw.org, OR fax to 703 373 4301.

Report on a LSU/KNUTE University, Kiev, Ukraine Better Process Control School, Kiev Ukraine, May 30-June 2,2006

The subject training course was sponsored by the International Institute for Food Safety and Quality (IIFSQ), Kiev, Ukraine, Louisiana State University (LSU), the Food Products Association, Washington, DC and US AID.

FDA regulations require that all operators of retorts, aseptic processing and packaging systems and container closure inspectors be under the operating supervision of a person who has attended and satisfactorily completed a school approved by the Commissioner. The objective of the course was to train industry supervisors to meet this requirement. The course was attended by twelve students primarily representing Eastern European food firms and one Ukrainian government official. Spinak participated in a course preparation meeting on May 29, 2006 at IIFSQ, Dr. Gennadii Myroniuk, Director General and Anna Vasylenko, Director International Relations of IIFSQ, Dr. Michael Moody of LSU and Joseph Schegal, Food Products Association (FPA), Washington, DC. Ms. Vasylenko stated that it had been difficult to convince the local industry to attend the school. This is because firms had not had any trouble exporting canned goods into the United States. In light of FDA inspections not being conducted in Eastern Europe and few problems importing products into the United State, many firms found little merit in sending staff to attend the course. Spinak promised to contact FDA and suggest that they consider performing inspections of firms in the region as part of a similar effort in South America. Such audits would reveal many problems and raise demand for training. The audits would need to be conducted as part of a capacity building project in the Ukraine to put in place a LACF program in the government. Once a program was developed in the Ukraine it could be modeled in neighboring countries.

Opening remarks of the course on May 30, 2006, were given by Dr. Michael Moody of LSU and Mr. Stephen H. Spinak, LSU Contractor. Dr. Moody and Mr. Spinak served as the principal course instructors. Anna Vasylenko of IIFSQ was the course coordinator. During Dr. Moody's remarks, he emphasized that FDA approval of this course was subject to an assessment which would not be completed until a short time period after the course was conducted.

Seven of the sixteen lecture modules were presented by Ukrainians. Dr. Myroniuk presented Acidified Food, Food Plant Sanitation and Process Room Instrumentation modules. Dr. Nataliya Prytulska (KNUTE) presented Food Container Handling, Metal Container, Glass Container and Semirigid and Flexible Container modules. Spinak presented Overpressure Retorts, Continuous Agitating Retorts, Discontinuous Agitating Retorts, Hydrostatic Retorts and Aseptic Processing and Packaging modules. The remaining modules were presented by Dr. Moody. All lectures met the course objectives. All seven lectures delivered by Ukrainian instructors were excellent. The course was organized and the examinations were properly proctored. Conduct of the examinations, grading of examinations and posting of examinations were performed with integrity. This was mainly performed by Mr. Joseph Schegal of FPA.

During the opening section, Spinak delivered a lecture on FDA regulatory requirements and described FDA's international outreach program in LACF. Spinak provided an overview of the FDA regulations, a detailed discussion of product definitions and exclusions from the

regulations, photographic examples of factory failures from inspections and a description of FDA's international LACF inspection program. Spinak provided interpretations of the regulations when requested by instructors. After each day's presentations and at the end of the course, Spinak attended meetings of the course faculty and support staff.

The course was successfully presented. The Ukrainian instructors were prepared and effective in their instruction. The facilities for the course were excellent. Spinak recommends that this report be provided to FDA with other required documents and that a request be made for FDA to approve the subject course.

There appears to be great interest in Eastern Europe to conduct additional schools. Complete assumption of course responsibility in the Ukraine can be achieved after one additional course. IIFSQ and KNUTE can achieve this with the continued support of LSU. The next major step is to have IIFSQ and additional local instructors move toward 75% responsibility for remaining lectures.

A few general comments on the BPCS course are in order. These comments are general to BPCS procedures. These were discussed in a post course meeting on June 5. They are:

- There should be an answer sheet used for the examinations to facilitate grading of exams as with an overlay. This could reduce grading time by half.
- Students did not have time to read the chapters in advance of the exams. When possible, the examinations should be conducted the following morning. Student performance is significantly affected by not having read the chapters.
- The books should be provided the night before the course starts. A suggested reading list should be provided.
- The examinations should be reviewed to improve certain questions. Questions unrelated to LACF regulations should be replaced.
- The lecture on Continuous Agitating Retorts and Discontinuous Agitating Retorts should be combined. Tests can still be done separately but there is a lot of duplication in the lectures and valuable time is lost.
- Consider doing the examinations in groups after a study period. There is a lot of unproductive time in the examination process.

Stephen H. Spinak
Email: spinak52@yahoo.com

Better Process Control School: Kiev, Ukraine

A report on a Better Process Control School conducted on May 30 – June 2, 2006 in Kiev, Ukraine through LSU/KNUTE/IIFSQ

Joseph Schlegel
Intern, Food Products Association
July 13, 2006

A Better Process Control School was held in Kiev, Ukraine on May 30 – June 2, 2006 for the purpose of training individuals working in thermal processing in the Eastern European region. This project was organized by Louisiana State University (LSU) through USAID. The Food Products Association (FPA) has allowed the translation of its text *Canned Foods: Principles of Thermal Process Control, Acidification and Container Closure Evaluation* and other materials into the Russian language for the purposes of this course. The International Institute for Food Safety and Quality (IIFSQ) in Kiev, Ukraine administered the course through the help of the Kiev National university of Trade and Economics (KNUTE).

To ensure that all of the requirements for such a course were met, as well as to help administer the course, Dr. Michael Moody from LSU and Dr. Steve Spinak formerly of FDA, attended the course and commanded 9 of the 16 lectures. Dr. Genadii Myroniuk of IIFSQ and Dr. Nataliya Prytulskaya of KNUTE commanded the other seven. Joseph Schlegel of FPA assisted with the course examinations and procedures, along with Ms. Anna Vasylenko and Ms. Oksana Dorofeyeva of IIFSQ, who acted as course coordinators.

Twelve students participated in the course. These students are professionals in the food industry from various regions of Ukraine, Georgia, and Kazakhstan. None of these students had participated in such a course before.

The course was taught through the assistance of two professional translators from Kiev, who conducted a live translation through the use of microphone/earphone technology. At the conclusion of each teaching module, students were required to complete an examination which tested their knowledge of the subject matter. These examinations were graded by Mr. Schlegel, who proctored the exams to ensure proper protocol was kept. At the conclusion of the course, 10 of the students passed the entire set of core modules required for FDA certification. These are, namely, Microbiology of Thermally Processed Foods, Food Container Handling, Food Plant Sanitation, Records for Product Protection, Principles of Thermal Processing, and Process Room Instrumentation, Equipment, and Operation. Each of the 12 students received certificates of attendance at the conclusion of the course.

A number of issues were discussed on Monday, May 29th, at a special coordination meeting at IIFSQ for all those taking part in the administration of the Better Process Control School. This meeting began at 8:00AM and included the presence of Ms. Vasylenko, Dr. Myroniuk, Dr. Moody, Dr. Spinak, and Mr. Schlegel. The issues discussed included governmental problems in Ukraine, compliance of firms exporting product, as well as administrative points.

Ms. Vasylenko explained that there are currently three sectors of the Ukrainian government that currently regulate the food industry: the Administration of Health, the Administration of Agriculture, and the Committee for Safe Standards. Until it is certain who will remain in leadership in the future, it is difficult to achieve any result from discussions with government officials. One delegate from the Committee for Safe Standards participated in the Better Process Control School.

None of the currently registered firms in Ukraine sent representatives to attend the Better Process Control School. This greatly worries Ms. Vasylenko who claimed that the companies feel there is no need to train an individual, when their firm has no problem exporting products to the United States without the training requirement being fulfilled. Dr. Spinak spoke at length with Ms. Vasylenko on this topic, and it was decided that a government audit program should be organized to determine the compliance of Ukrainian facilities. Ms. Vasylenko requested that the United States should halt acceptance of product from companies that fail to meet the requirement. A consensus was reached that companies should be told they are not in compliance and given a period of time to comply with the standards, then, if they do not meet the requirements at the later date, their product should not be accepted for importation. The Ukrainian government must set up its own regulations to prevent unauthorized product from being exported.

Sixteen topics were covered during the course. These were as follows: Microbiology of Thermally Processed Foods, Acidified Foods, Food Container Handling, Food Plant Sanitation, Records for Product Protection, Principles of Thermal Processing, Process Room Instrumentation, Equipment, and Operation, Still Retorts – Pressure Processing in Steam, Still Retorts – Processing with Overpressure, Hydrostatic Retorts – Continuous Container Handling, Agitating Retorts – Continuous Container Handling, Agitating Retorts – Discontinuous Container Handling, Aseptic Processing and Packaging Systems, Closures for Metal Containers, Closures for Glass Containers, and Closures for Semirigid and Flexible Containers.

The passing grade for each multiple-choice examination was 70 percent. The exams tested their knowledge of the subject matter. If a student did not achieve at least 70% on an exam, he/she was given an opportunity to retake the exam at the end of the day. If again he/she did not pass, a final opportunity was given to them to retake the exam. Upon review of the examination results, Dr. Spinak and Mr. Schlegel decided that a number of the questions were too vague and incoherent to be included in future examinations. Such suggestions were passed along to FPA for consideration.

The exams were administered in a manner keeping with good procedure. Speaking was not permitted during the exams, except for clarification of specific questions; all notes and books were closed prior to handing the tests out to the students.

The examination process currently utilized by the Better Process Control School seems to be unsatisfactory for a number of reasons. First, it tests only the limited, short-term memory capacity of the students. There needs to be adequate time for personal study of the material in the text, since the exams cover this material most extensively.

Second, the exams take away valuable learning time and disrupt the flow of the course. After each module, an exam which takes around 30 minutes to complete is given to the students. This causes a large break in the flow of the course, and causes students to lose their concentration. There is not a significant amount of time for the information to fully sink in, and there is not enough time to allow for a substantial review of the material.

Third, the time it takes to display the examination results is too long. To grade the exams, the key has to be looked at and each question graded individually by hand. This process is prone to error, and therefore, great care must be taken to ensure that proper grading takes place. This extra effort requires additional time. It was not uncommon during this course for the students to find out their results from an exam only after they had taken two other exams. In a course that builds upon previous topics, such as this, it is vital that the students know how well they understand the material before they begin their study of new material. It would be of great benefit to the students to know whether or not they passed an exam before they begin to take the next exam. Not knowing this causes students to feel rushed and unprepared. This could be fixed by supplying a key to each exam, with holes in the proper places for marking the answers. Alternatively, a bubble sheet system could be initiated to allow for quicker grading and more accurate results.

The final reason that the examination process is unsatisfactory is that it does not allow for student self-improvement. The way that the retakes are administered, is that an identical test is given to the students to complete. This undermines the nature of testing, and the purpose of keeping the tests secretive in the first place. The test no longer becomes one of knowledge, but of the power to recall the information and look for it in the textbook prior to the retake. Also, the students are not allowed to see which specific answers they missed at the conclusion of the testing, because there is a possibility of them needing to retest. This means that the students lack the valuable learning that takes place in knowing the reasons for missing a certain question. A suggestion would be to have an alternate exam for retesting purposes, and that the results of the exam would be disclosed in full to the students at the close of the examination period. This would allow for a more concentrated study prior to retakes; it would also allow for a verification process of the results. Even the best grader can make a mistake, and the results need to be seen by all to ensure correct grading.

Altering the examination process as it now stands by following the suggestions listed above would allow for a more functional process with more inclusive results. However, despite the shortcomings of the examination process, great care was taken to insure that proper procedure was followed. The results are fair and accurate, and the students received viable feedback. By analyzing the results of the exams, it can be concluded that the students did well overall, albeit with many areas for improvement. Those who passed the tests are deserving of certification.

At the close of the course, evaluation forms were given to each student for completion. These forms allowed for the students to give constructive criticism of the course and its contents. They allowed for the instructors and coordinators to understand how the students perceived certain portions of the course. It is beneficial to know what the students expected to get out of the course, and what they expected to be done differently. By knowing the students' suggestions and complaints, changes can be made to the course for the future.

The overall evaluation results were very positive. 10 of the 12 students filled out evaluation forms; two had to leave early. Those who evaluated the course were very pleased with the way the course was conducted. The positive reviews are very promising; the future prosperity of the program in Ukraine depends on its usefulness for the participants.

The Ukrainian instructors did an excellent job in teaching the material in a useful and clear manner. The English-speaking instructors, although depending on the translation for clarity, were able to teach the material in a very thorough and accurate manner.

Mr. Schlegel concurs with his colleagues, Dr. Spinak and Dr. Moody, that the Better Process Control School in Kiev, Ukraine on May 30 - June 2, 2006 was conducted correctly and efficiently, following all of the proper protocol outlined by the FDA for certification purposes. The Food Products Association should continue to lend its support to Louisiana State University to continue this endeavor, together with the International Institute for Food Safety and Quality in Kiev, Ukraine. The program is of great benefit to international food processors.

The Better Process Control School in Kiev, Ukraine was a great success. There is great potential in the Eastern European region for improvement in thermal processing procedures, and this course helped many to come to a realization of the improvements that need to be made. The organizational structure of the course is well fit to care for the needs of future students. The Ukrainian instructors from this year's course form a solid foundation of knowledge on which future teachers can build. The students were well-selected, and will have a great impact on their companies as they implement the material that they learned during the course.

Although a number of issues within the country of Ukraine need to be worked out, the country is advancing in the world market. Despite the various problems that were encountered during the course, the overall reaction was very positive, and reflects the extensive care that was taken to provide an exceptional experience to all participants.